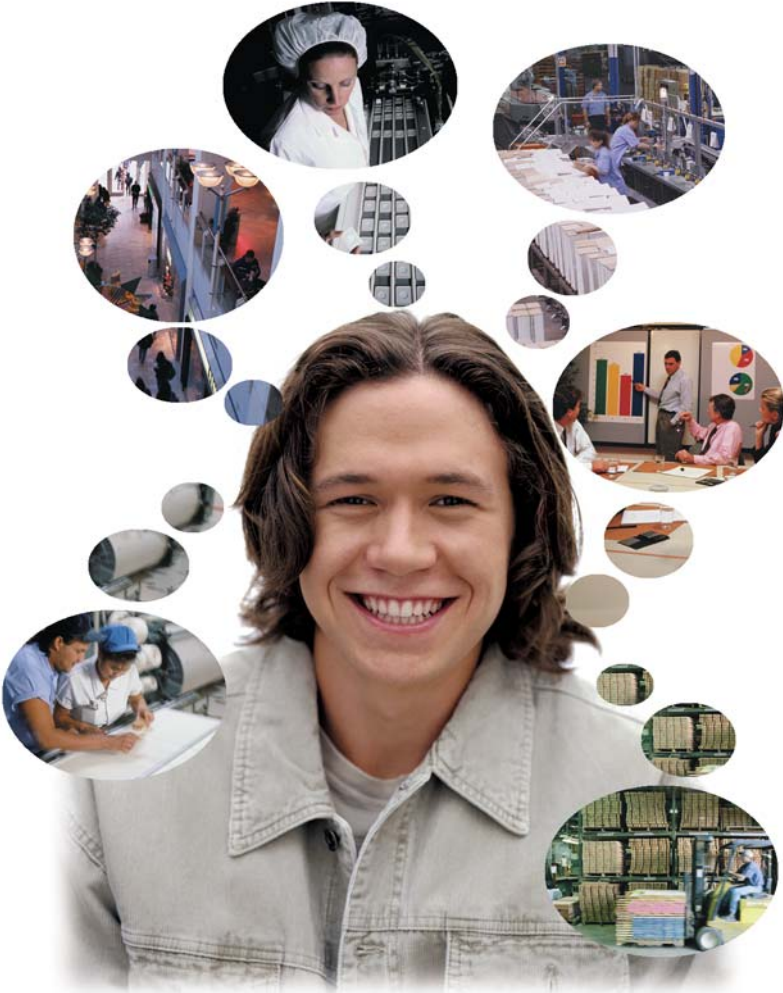


CAREER CLUSTERS—FOCUSING EDUCATION ON THE FUTURE



Career Cluster Resources for Manufacturing



www.careerclusters.org

PREFACE

Manufacturing was one of the original two Linkages Projects funded by the U. S. Department of Education and as such was developed under a totally different set of guidelines than were the eleven Career Clusters led by the State Directors. To make Manufacturing parallel to the other Career Clusters, VTECS was given a small grant very late in the game to make Manufacturing look and feel like the other clusters in terms of format, content, etc. Given that there was neither the time nor money to go through the entire process that had to be followed by the other projects, Ron McCage decided to build the Manufacturing Cluster Knowledge and Skill Statements around the National Skill Standards for Manufacturing as developed by the Manufacturing Skill Standards Council under the National Skill Standards Board partnership structure.

VTECS started the process by using the MSSC Critical Work Functions and Key Activity Statements for the six MSSC pathways and wrote measurement criteria for each of those that were deemed to be appropriate for the introduction of manufacturing concepts at the high school level as contrasted to the mastery level as represented by the MSSC Skill Standards Measurement Criteria. By using the MSSC document as a base, we were able to start with a recently nationally validated list of critical work functions and key activities which lessened the need to repeat this process, which saved a significant amount of developmental time. Second, by doing it this way we furthered the goal of making the work accomplished through the cluster initiative more parallel with the National Skill Standards Board efforts. VTECS is indebted to Joyce Anderson and Chris Olson for the effort they put into the conversion process.

Ronald D. McCage, Ed.D.
Executive Director, VTECS

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Introduction

The States' Career Cluster Initiative

9/01/02

Charles Losh, Ph.D., Project Director

The U.S. Department of Education Office of Vocational and Adult Education (OVAE) has identified 16 career clusters representing career opportunities for the 21st century economy. These clusters will frame student opportunities as they pursue postsecondary education and a wide range of career opportunities from front-line to professional and managerial careers.

Helping students make their dreams become a reality was the driving force behind the nation's Career Clusters initiative launched June 1, 2001. Twelve lead states and the District of Columbia were partners in the development of the tools supporting eleven career clusters which, when combined with the five clusters that have already been developed, will represent all career possibilities.

The National Association of State Directors for Career and Technical Education Consortium (NASDCTEc) and their Board of Directors assumed leadership for coordinating the project. This in itself was unique for a project of this scope. The Board and the State Directors organization believed that this initiative was of such potential impact on the Career Technical delivery system in the country that they needed to play this leadership role in the project, assuring that the materials had utility in their states once completed. Therefore, the NASDCTEc in conjunction with the State of Oklahoma (the project fiscal agent) prepared and submitted a proposal to OVAE in January of 2001. This proposal was funded at a \$2.2 million dollar level, with expectations of a second year of funding of \$2.5 million. The plan to develop eleven curriculum frameworks was very aggressive, given that each of the prior projects, designed to develop and pilot test materials for a single cluster, had received in excess of \$1 million dollars for their multiyear development work.

The project was designed to establish curriculum frameworks and supportive materials for each cluster, with a broad-based advisory committee for each cluster, led by a state. There was also a National Advisory Committee consisting of members from each of the cluster committees, along with other stakeholders. The National and State Cluster advisory committees were responsible for identifying the frameworks, pathway and foundation knowledge and skills, and other supportive

materials. The committees included representatives from states, schools, education and training, business and industry, associations, and others directly impacted by the materials.

The development of materials for each of the eleven clusters was led by a different state, with business and industry at the helm. The lead states included: Idaho and Iowa (jointly leading the Agriculture, Food and Natural Resources cluster), Pennsylvania (Architecture and Construction), Ohio (Marketing, Sales and Service), North Dakota (Finance), West Virginia (Hospitality and Tourism), South Carolina (Business, Management and Administration), Kentucky (Human Services), Arkansas (Law, Public Safety and Security), North Carolina (Science, Technology, Engineering and Mathematics), Michigan (Education and Training), and Oklahoma and the District of Columbia/Washington D.C. (jointly leading the Government and Public Administration cluster).

The five additional career clusters included Health Science led by the State of Utah, Manufacturing led by the State of Indiana, Arts, Audio Video Technology and Communications led by the V-TECS Consortium, Information Technology led by the Educational Development Center, Inc., and Transportation, Distribution and Logistics Cluster led by the State of Illinois. These clusters plan to complete their work by June 30 of 2003.

To facilitate and coordinate the developmental work of the Cluster Initiative, staff was identified and housed at the Oklahoma Department of Career and Technical Education. The staff consisted of four Cluster Coordinators: Marsha Daves, Greg Dewald, Curtis Shumaker, and Pam Stacey. Additionally, Denise Christy provided research and web development support, Lisa Batchelder provided financial support, and Karan Smith provided administrative support.

Development work for the States' Career Clusters Initiative began June 1, 2001, and the first meeting of lead states, OVAE staff, and cluster staff was held in Oklahoma City in mid-June. At this meeting, project objectives, general direction, timelines, and the initial research goals were identified. This work continued through the fall and winter of 2001 and included the identification of cluster advisory committee members, the development of cluster frameworks based on the prototype cluster models provided by V-TECS, and the identification of occupations and draft pathways along with degrees and certificates associated with the career specialties/occupations in each of the clusters.

In January of 2002, the lead state teams were brought together in Phoenix to begin the process of developing knowledge and skill statements for each of the cluster pathways and foundations. Contracted writers and lead state cluster advisory committee members, depending upon

the decisions of cluster leadership, carried out this work. A part-time editor in Oklahoma provided consistency across the cluster knowledge and skill statements. One concern that was addressed early in the process was the need for a “common look and feel” across the clusters. Ultimately, this was accomplished not only for the eleven clusters in the States’ Career Clusters Initiative, but also through close cooperative relationships between the projects, all the cluster knowledge and skill statements were developed (or retro-fitted) using the same format. This format includes a knowledge/skill statement with associated performance elements and measurement criteria. This format provides the tools needed for curriculum and assessment developers as they take the materials to the classroom.

The National Advisory Committee met in March of 2002, and reviewed the curriculum frameworks, credentials list, and lead state advisory committee memberships and structures, and forwarded those materials to the Executive Committee for the Project. The Executive Committee, made up of the Board of the NASDCTEc, also met in March, approved the materials and discussed the future actions needed to assure implementation of the cluster materials.

Originally, the project was designed for a minimum of two years and was to include the identification of 110 pilot test sites across the country, along with the development of assessments and certifications for the clusters. The Office of Vocational and Adult Education, however, determined in November of 2001 that the goals of the project were “too broad”, and terminated the project as of September 30, 2002.

Development of the products needed for curriculum and assessment was fast-tracked, with the knowledge and skill statements, performance elements and measurement criteria ready for validation by July 15, 2002. This was the result of a major effort of lead state advisory committees and staff responding to the shortened timeline and the need for quality product.

Given the efforts of the developmental teams, cluster advisory committee members were able to review and validate the knowledge and skills and supporting elements. Additionally, a national web-based validation was conducted from July 15 to August 15, 2002. All 50 states were invited to a dissemination meeting held in Charleston, South Carolina Sept 13, 2002, where the materials were distributed to participants for their use in updating their curriculum.

For further information on the status of the materials, go to the web-site, <http://www.careerclusters.org/>.

Section I – Pathway Model



Manufacturing Cluster

Planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Sample Career Specialties/Occupations						
<ul style="list-style-type: none">AssemblersAutomated Manufacturing TechniciansBookbindersCalibration TechniciansElectrical Installers and RepairersElectromechanical Equipment AssemblersExtruding and Drawing Machine Setters/Set-Up OperatorsExtrusion Machine OperatorsFoundry WorkersGrinding, Lapping, and Buffing Machine OperatorsHand Packers and PackersHoist and Winch OperatorsInstrument MakersLarge Printing Press Machine Setters and Set-Up OperatorsMachine OperatorsManagers, SupervisorsMedical Appliance MakersMilling Machine Setters, Set-Up OperatorsMillwrightsOperators, Tenders, Cutters/Brazers, Soldering, Machine OperationsPaintersPattern & Model MakersPrecision Layout WorkersPrecision Optical Goods WorkersProduction AssociatesSheet Metal WorkersSolderers and BraziersTool and Die MakersWelders	<ul style="list-style-type: none">Design EngineersElectrical and Electronic Technicians and TechnologistsElectronics EngineersEngineering and Related Technicians and TechnologistsEngineering TechniciansIndustrial EngineersLabor Relations ManagersManufacturing EngineersManufacturing TechniciansPower Generating and Reactor Plant OperatorsPrecision Inspectors, Testers, and GradersProcess Improvement TechniciansProduction ManagersPurchasing AgentsSupervisors	<ul style="list-style-type: none">Biomedical Equipment TechniciansBoilermakersCommunication System Installers/RepairersComputer Installers/RepairersComputer Maintenance TechniciansElectrical Equipment Installers/RepairersFacility ElectriciansIndustrial Electronic Installers/RepairersIndustrial Facilities ManagersIndustrial Machinery MechanicsIndustrial Maintenance ElectriciansIndustrial Maintenance MechanicsIndustrial Maintenance TechniciansInstrument Calibration and RepairersInstrument Control TechniciansJob/Fixture DesignersLaser Systems TechniciansMaintenance RepairersMajor Appliance RepairersMeter Installers/RepairersMillwrightsPlumbers, Pipe Fitters and Steam FittersSecurity System Installers/Repairers	<ul style="list-style-type: none">Calibration TechniciansInspectorsLab TechniciansProcess Control TechniciansQuality Control TechniciansQuality EngineersSPC Coordinators	<ul style="list-style-type: none">Communications, Transportation and Utilities ManagersDispatchersFreight, Stock, and Material MoversIndustrial Truck and Tractor OperatorsLogistical EngineersLogisticiansMaterial AssociatesMaterial HandlersMaterial MoversProcess Improvement TechniciansQuality Control TechniciansTraffic ManagersTraffic, Shipping, and Receiving Clerks	<ul style="list-style-type: none">Environmental EngineersEnvironmental SpecialistsHealth and Safety RepresentativesSafety CoordinatorsSafety EngineersSafety Team LeadersSafety Technicians	
Path ways	Production	Manufacturing Production Process Development	Maintenance, Installation & Repair	Quality Assurance	Logistics & Inventory Control	Health, Safety and Environmental Assurance
Cluster K & S	Cluster Knowledge and Skills					
<ul style="list-style-type: none">Academic Foundations ♦ Communications ♦ Problem Solving and Critical Thinking ♦ Information Technology Applications ♦ Systems ♦ Safety, Health and Environmental ♦ Leadership and Teamwork ♦ Ethics and Legal Responsibilities ♦ Employability and Career Development ♦ Technical Skills						

Section II – Cluster Knowledge and Skills

Manufacturing

Cluster Knowledge and Skill Statement

Communications

Statement: *Comprehend the use of reading strategies to learn meaning, technical concepts, vocabulary, and to bring together information needed for a particular situation.*

Performance Element: Select and use the reading strategy or strategies (e.g., skimming, reading for detail, reading for meaning and critical analysis) needed to fully comprehend a written document.

Measurement Criteria: Summarize overall purpose of text.

Measurement Criteria: Identify key technical concepts and vocabulary.

Measurement Criteria: Identify complexities and discrepancies.

Measurement Criteria: Determine relevance, accuracy and appropriateness for a given purpose.

Performance Element: Interpret, transcribe, and communicate information, data, and observations from a written document for use in an actual situation.

Measurement Criteria: Explain meaning of new terms, vocabulary and concepts.

Measurement Criteria: Interpret technical materials.

Measurement Criteria: Summarize overall meaning of text.

Measurement Criteria: Write specific steps for applying information learned to task or new situation.

Measurement Criteria: Share information from text with others and show how it can be applied to a particular task or new situation.

Statement: *Locate, organize, and document written information from various sources needed by co-workers and clients/participants.*

Performance Element: Locate written information needed by co-workers and clients/participants.

Measurement Criteria: Conduct search of information on topic using card catalog, keywords, and/or search engines.

Measurement Criteria: Locate variety of resources such as books, journals, and electronic forms including the Internet.

Measurement Criteria: Organize resources to share key information.

Performance Element: Organize information for use in written and oral communications.

Measurement Criteria: Read and take notes from selected resources.

Measurement Criteria: Prepare outline that emphasizes major points with supporting data.

Measurement Criteria: Present information in organized, easy-to-follow manner.

Performance Element: Document the source and proper reference for written information.

Measurement Criteria: Prepare a bibliography using the style prevalent in a given manufacturing situation.

Measurement Criteria: Use parenthetical, footnotes and endnotes text citations accurately.

Measurement Criteria: Follow plagiarism and copyright rules and regulations.

Statement: *Use correct grammar, punctuation and terminology to write and edit documents.*

Performance Element: Write documents with more than one paragraph to be clear, succinct, and accurate.

Manufacturing

Cluster Knowledge and Skill Statement

Measurement Criteria: *Organize and arrange information for effective coherence.*

Measurement Criteria: *Report relevant information in order of occurrence.*

Measurement Criteria: *Interpret information, data, and observations correctly.*

Measurement Criteria: *Present main ideas and supporting facts.*

Performance Element: Use knowledge of audience and their need to prepare written documents.

Measurement Criteria: *Use technical terms and concepts.*

Measurement Criteria: *Incorporate and use references effectively and accurately.*

Measurement Criteria: *Report objective and/or subjective information.*

Performance Element: Use correct grammar, spelling, punctuation and capitalization to prepare written documents.

Measurement Criteria: *Use correct grammar and sentence structure.*

Measurement Criteria: *Use correct spelling.*

Measurement Criteria: *Use correct punctuation and capitalization.*

Performance Element: Use computer skills to design and develop written and supporting material.

Measurement Criteria: *Use word processing software to develop text, charts, graphs or figures correctly.*

Measurement Criteria: *Use presentation software to prepare visual support materials.*

Measurement Criteria: *Format written documents with correct font and layout for easy reading.*

Statement: *Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.*

Performance Element: Prepare oral presentation to provide information for intended purpose and audience.

Measurement Criteria: *Know subject matter well enough to be independent of written aids.*

Measurement Criteria: *Identify characteristics of the audience and adjust to their ability to understand.*

Measurement Criteria: *Use technical terms and concepts correctly.*

Measurement Criteria: *Use proper organization and structure to achieve coherence of major points.*

Performance Element: Identify and prepare support materials to accompany oral presentation.

Measurement Criteria: *Identify media and visual aids appropriate to understanding of topic.*

Measurement Criteria: *Prepare visual aids and support materials for easy viewing and without error.*

Measurement Criteria: *Operate any equipment used with support materials smoothly and efficiently.*

Measurement Criteria: *Adhere to basic visual communication principles.*

Measurement Criteria: *Rehearse presentation as needed.*

Cluster Knowledge and Skill Statement

Performance Element: Deliver presentation to sustain listener's attention and interest.

Measurement Criteria: *Deliver presentation without grammatical error.*

Measurement Criteria: *Speak clearly with appropriate volume, rate and gestures while making and maintaining appropriate eye contact.*

Measurement Criteria: *Use support materials in the presentation that enhance the understanding of the topic and the interest level of the audience.*

Measurement Criteria: *Stay within presentation time parameters.*

Measurement Criteria: *Evaluate listeners' interest and receptiveness.*

Measurement Criteria: *Use verbal and nonverbal feedback strategies to engage discussion and adjust message and delivery.*

Measurement Criteria: *Respond to questions and comments on presentation.*

Statement: Interpret verbal and nonverbal behaviors to enhance communication with co-workers and clients/participants.

Performance Element: Interpret verbal behaviors to enhance communication.

Measurement Criteria: *Identify verbal cues (e.g., voice speed, voice quality and tone).*

Measurement Criteria: *Explain how verbal cues conveyed the message.*

Performance Element: Interpret nonverbal behaviors to enhance communication.

Measurement Criteria: *Identify nonverbal cues (e.g., eye contact, facial expressions, posture, gestures and other body language).*

Measurement Criteria: *Explain the message(s) conveyed by nonverbal cues.*

Statement: Apply active listening skills to obtain and clarify information.

Performance Element: Interpret message/information given to clarify information.

Measurement Criteria: *Determine familiarity of discussion.*

Measurement Criteria: *Respond accordingly using appropriate verbal and non-verbal language.*

Measurement Criteria: *Explain the message given in your own words.*

Performance Element: Respond with restatement and clarification techniques to clarify information.

Measurement Criteria: *Ask questions to seek or confirm understanding.*

Measurement Criteria: *Paraphrase and/or repeat information.*

Measurement Criteria: *Record and summarize information in written notes.*

Measurement Criteria: *Follow directions and/or respond in a positive way with clear, concise comments.*

Statement: Interpret and use information in tables, charts, and figures to support written and oral communications.

Performance Element: Interpret information found in tables, charts, and figures to support written and oral communications.

Measurement Criteria: *Compile facts and arrange in an organized manner for a table, chart or figure.*

Measurement Criteria: *Document sources of data.*

Measurement Criteria: *Determine most appropriate way to display data for effective coherence.*

Measurement Criteria: *Prepare table, chart, graph or figure for inclusion in publication or presentation.*

Cluster Knowledge and Skill Statement

Performance Element: Use tables, charts and figures to support written and oral communication.

Measurement Criteria: *Evaluate reference or source of data for authenticity and reliability.*

Measurement Criteria: *Explain information presented in tables, charts and figures.*

Measurement Criteria: *Prepare written summary of findings expressed in tables, charts and figures.*

Cluster Knowledge and Skill Statement

Problem Solving and Critical Thinking

Statement: *Formulate solutions to problems using critical thinking skills while working independently and/or in teams.*

Performance Element: Describe the value of using problem-solving and critical thinking skills to improve a situation or process.

Measurement Criteria: *Define problem-solving methods accepted in the manufacturing industry.*

Measurement Criteria: *Explain how using a defined problem solving system can improve a situation or process and benefit all parties involved.*

Performance Element: Prepare ideas, proposals, and solutions to problems using concrete terms.

Measurement Criteria: *Clarify the problems or issues to be addressed and the objectives.*

Measurement Criteria: *Identify constraints and parameters.*

Measurement Criteria: *Obtain and analyze available information.*

Measurement Criteria: *Generate alternative ideas, proposals, and solutions that appear useful in solving the problem.*

Measurement Criteria: *Evaluate alternative solutions by using information and data from a variety of sources and separating the irrelevant from the relevant.*

Measurement Criteria: *Identify the best solution based on risks related to costs, schedules, and quality.*

Measurement Criteria: *Use the logic and rationale for the solution to present the solution.*

Performance Element: Analyze and evaluate ideas, proposals, and solutions to problems.

Measurement Criteria: *Confirm definition of problem and objectives.*

Measurement Criteria: *Confirm constraints and parameters.*

Measurement Criteria: *Evaluate the underlying assumptions.*

Measurement Criteria: *Evaluate the quality of information used, the analysis of data used to support the solution.*

Measurement Criteria: *Evaluate the logic and reasoning used to develop the solution.*

Measurement Criteria: *Evaluate the risks, costs, and benefits of testing and implementing the solution.*

Performance Element: Develop solution to performance problems using a structured problem-solving process.

Measurement Criteria: *Describe the problem completely and accurately using data and graphs and charts.*

Measurement Criteria: *Develop and present a comprehensive mapping of potential root and indirect causes (e.g. fishbone diagrams).*

Measurement Criteria: *Identify and evaluate alternative solutions.*

Measurement Criteria: *Test and evaluate best solutions.*

Measurement Criteria: *Develop plans to fully implement solutions to address performance problem.*

Cluster Knowledge and Skill Statement

Information Technology Applications

Statement: *Use Personal information Management (PIM)/ Productivity applications.*

Performance Element: Manage personal schedule and contact information.

Measurement Criteria: *Create prioritized-tasks (to-do) list.*

Measurement Criteria: *Manage daily/weekly/monthly schedule using applications.*

Measurement Criteria: *Manage personal and professional contact information.*

Performance Element: Create memos and notes.

Measurement Criteria: *Create reminder for oneself.*

Measurement Criteria: *Create and send notes, informal memos, and reminder using PIM applications.*

Statement: *Use electronic mail applications.*

Performance Element: Use email to communicate within and across organizations.

Measurement Criteria: *Access email system using login and password functions.*

Measurement Criteria: *Access email messages received.*

Measurement Criteria: *Create email messages in accordance with established business standards (e.g., grammar, word usage, spelling, sentence structure, clarity, email etiquette).*

Measurement Criteria: *Send email messages.*

Performance Element: Use email to share files and documents.

Measurement Criteria: *Access email attachments.*

Measurement Criteria: *Attach documents to messages.*

Measurement Criteria: *Save email messages/attachments.*

Measurement Criteria: *Demonstrate knowledge of contamination protection strategies for email.*

Statement: *Use Internet Applications.*

Performance Element: Search for information and resources.

Measurement Criteria: *Select search engine(s) to use.*

Measurement Criteria: *Select appropriate search procedures and approaches.*

Measurement Criteria: *Locate information using search engine(s) and Boolean logic.*

Measurement Criteria: *Navigate web sites using software functions.*

Performance Element: Access and evaluate Internet resources.

Measurement Criteria: *Access business and technical information using the Internet.*

Measurement Criteria: *Access commercial, government, and education resources.*

Measurement Criteria: *Evaluate Internet resources (e.g., accuracy of information).*

Statement: *Use writing/publishing applications.*

Performance Element: Prepare simple documents and other business communications.

Measurement Criteria: *Retrieve existing documents.*

Measurement Criteria: *Create documents (e.g., letters, memos, reports) using existing forms and templates.*

Measurement Criteria: *Safeguard documents using name and save functions.*

Measurement Criteria: *Format text using basic formatting functions.*

Measurement Criteria: *Employ word processing utility tools (e.g., spell checker, grammar checker, thesaurus).*

Cluster Knowledge and Skill Statement

Performance Element: Prepare reports and other business communications, integrating graphics and other non-text elements.

Measurement Criteria: *Use advanced formatting features (e.g., headers/footers/dropped caps, indexing).*

Measurement Criteria: *Place graphics and tables in document.*

Measurement Criteria: *Enhance publications using different fonts, styles, attributes, justification, etc.*

Measurement Criteria: *Enhance publications using paint/draw functions.*

Performance Element: Prepare complex publications.

Measurement Criteria: *Create new word processing forms, style sheets, and templates.*

Measurement Criteria: *Prepare publications using desktop publishing software.*

Measurement Criteria: *Format new desktop publishing files.*

Measurement Criteria: *Output desktop publishing files.*

Statement: Use presentation applications.

Performance Element: Prepare presentations for training, sales, and information sharing.

Measurement Criteria: *Create computer presentations and handouts in accordance with basic principles of graphics design and visual communication.*

Measurement Criteria: *Insert graphic elements (e.g., graph, clip art, table) in a slide.*

Measurement Criteria: *Edit presentations.*

Performance Element: Deliver presentations with supporting materials.

Measurement Criteria: *Identify hardware items that support presentation software (e.g., scanners, digital cameras, printers, and projection systems).*

Measurement Criteria: *Print a single slide, an entire presentation, an outline, and notes.*

Measurement Criteria: *Run slide shows manually and automatically.*

Statement: Use spreadsheet applications.

Performance Element: Create a spreadsheet.

Measurement Criteria: *Create a spreadsheet.*

Measurement Criteria: *Retrieve existing spreadsheets.*

Measurement Criteria: *Edit spreadsheets.*

Measurement Criteria: *Save spreadsheets.*

Measurement Criteria: *Print spread sheets.*

Performance Element: Perform calculations and analysis on data.

Measurement Criteria: *Group worksheets.*

Measurement Criteria: *Create charts and graphs from spreadsheets.*

Measurement Criteria: *Perform calculations using simple formulas.*

Measurement Criteria: *Input/process data using spreadsheet functions.*

Statement: Use database applications.

Performance Element: Manipulate data elements.

Measurement Criteria: *Enter data using a form.*

Measurement Criteria: *Locate/replace data using search and replace functions.*

Measurement Criteria: *Process data using database functions (e.g., structure, format, attributes, relationships, keys).*

Cluster Knowledge and Skill Statement

Performance Element: Manage, analyze, and report on interrelated data elements.

Measurement Criteria: Search a database table to locate records.

Measurement Criteria: Sort data using single- and multiple-field sorts.

Measurement Criteria: Perform single-and multiple-table queries (e.g., create, run, save).

Measurement Criteria: Print forms, reports, and results of queries.

Measurement Criteria: Verify accuracy of output.

Statement: Use collaborative/groupware applications.

Performance Element: Facilitate group work through management of shared schedule and contact information.

Measurement Criteria: Manage daily/weekly/monthly schedule using applications.

Measurement Criteria: Maintain shared database of contact information.

Statement: Use computer operations applications.

Performance Element: Manage computer operations.

Measurement Criteria: Apply basic commands of operating system software.

Measurement Criteria: Employ desktop operating skills.

Performance Element: Manage file storage.

Measurement Criteria: Apply appropriate file and disk management techniques.

Measurement Criteria: Differentiate between files and directories.

Measurement Criteria: Determine file organization.

Measurement Criteria: Demonstrate knowledge of the system utilities used for file management.

Performance Element: Compress or alter files.

Measurement Criteria: Convert file formats.

Measurement Criteria: Unpack files using compression software.

Measurement Criteria: Convert existing files.

Statement: Use computer-based equipment (containing embedded computers or processors used to control electromechanical devices).

Performance Element: Operate computer driven equipment and machines.

Measurement Criteria: Secure needed supplies and resources.

Measurement Criteria: Follow power-up and log-on procedures.

Measurement Criteria: Interact with/respond to system messages using console device.

Measurement Criteria: Run applications/jobs in accordance with processing procedures.

Measurement Criteria: Follow log-off and power-down procedure(s).

Performance Element: Use installation and operation manuals.

Measurement Criteria: Access needed information using appropriate reference materials.

Cluster Knowledge and Skill Statement

Performance Element: Troubleshoot computer driven equipment and machines and access support as needed.

Measurement Criteria: *Test system using diagnostic tools/software.*

Measurement Criteria: *Repair/replace malfunctioning plug and play hardware.*

Measurement Criteria: *Reinstall software as needed.*

Measurement Criteria: *Recover data and/or files.*

Measurement Criteria: *Restore system to normal operating standards.*

Cluster Knowledge and Skill Statement

Systems

Statement: *Demonstrate knowledge of how manufacturing businesses operate.*

Performance Element: Explain the role and major functions of manufacturing businesses.

Measurement Criteria: *Explain the importance of manufacturing to society.*

Measurement Criteria: *Identify the mission, major internal functions and structure of manufacturing businesses.*

Measurement Criteria: *Identify the customers, suppliers, and stakeholders of manufacturing businesses, their roles, and how they relate.*

Measurement Criteria: *Explain the major competitive challenges faced by the manufacturing businesses.*

Measurement Criteria: *Identify and describe types of manufacturing systems.*

Measurement Criteria: *Analyze current trends in manufacturing systems.*

Performance Element: Explain how manufacturing businesses manage performance.

Measurement Criteria: *Explain how financial performance is measured.*

Measurement Criteria: *Explain how market performance is gauged.*

Measurement Criteria: *Explain how service and internal operations performance is determined.*

Measurement Criteria: *Explain how compliance and performance related to health, safety, and environment are evaluated.*

Performance Element: Explain how changes outside the manufacturing business impact the manufacturing business.

Measurement Criteria: *Explain the impact of economic changes.*

Measurement Criteria: *Explain the impact of social changes.*

Measurement Criteria: *Explain the impact of technology changes.*

Performance Element: Explain the role of risk management in reducing risks and improving performance in manufacturing businesses.

Measurement Criteria: *Explain the objectives of risk management programs.*

Measurement Criteria: *Explain the major types of loss exposure for manufacturing businesses.*

Measurement Criteria: *Explain the approaches for managing organizational risks.*

Performance Element: Explain the roles and functions of government in regulating and supporting manufacturing businesses.

Measurement Criteria: *Explain the roles in regulating domestic operations.*

Measurement Criteria: *Explain the roles in regulating international operations.*

Measurement Criteria: *Explain the roles in managing the infrastructures of manufacturing businesses.*

Measurement Criteria: *Explain the roles in health, safety, and environmental management.*

Statement: *Demonstrate knowledge of how manufacturing businesses improve performance.*

Performance Element: Explain how manufacturing businesses manage customer relationships.

Measurement Criteria: *Identify needs and requirements of internal and external customers.*

Manufacturing

Cluster Knowledge and Skill Statement

Measurement Criteria: *Describe customer satisfaction and fulfillment of customer requirements.*

Measurement Criteria: *Explain how manufacturing businesses respond to customer problems and complaints.*

Performance Element: **Explain how planning and budgeting are used to accomplish organizational goals and objectives.**

Measurement Criteria: *Explain how work plans and budgets are used to allocate people and resources.*

Measurement Criteria: *Identify reports used to track performance and resource and explain how they are used.*

Measurement Criteria: *Explain how plans and budgets are revised to meet goals and objectives.*

Performance Element: **Explain how planning is used to improve overall performance.**

Measurement Criteria: *Identify and describe the most critical performance problems that manufacturing businesses typically face.*

Measurement Criteria: *Describe how improvements are identified.*

Manufacturing

Cluster Knowledge and Skill Statement

Safety, Health, and Environmental

Statement: *Demonstrate knowledge of safety, health, and environmental management systems.*

Performance Element: Describe the major regulatory areas.

Measurement Criteria: *Identify specific health and safety laws and regulations that impact manufacturing and the major areas they address.*

Measurement Criteria: *Identify specific environmental management laws and regulations and the major areas they address.*

Measurement Criteria: *Explain how the manufacturing industry and its organizations typically perceive the major components.*

Performance Element: Explain how government agencies ensure compliance and promote improved performance.

Measurement Criteria: *Provide examples of the major measures and types of data used by government to measure and monitor performance.*

Measurement Criteria: *Provide examples of how manufacturing organizations ensure their compliance.*

Measurement Criteria: *Provide examples of consequences that manufacturing organizations suffer when they fail to comply.*

Performance Element: Demonstrate commitment to policies and procedures.

Measurement Criteria: *Promote and maintain knowledge of organizational safety, health, and environmental management policies and procedures.*

Measurement Criteria: *Follow organizational policies and procedures.*

Measurement Criteria: *Educate and orient other workers.*

Measurement Criteria: *Maintain a safe work area.*

Measurement Criteria: *Identify, describe, and report workplace hazards.*

Measurement Criteria: *Perform and participate in regular audits and inspections.*

Measurement Criteria: *Provide and maintain documentation needed for compliance.*

Measurement Criteria: *Conduct and participate in accident/incident investigations.*

Performance Element: Develop plans to improve safety performance.

Measurement Criteria: *Use structured problem-solving process to develop improvement plans.*

Cluster Knowledge and Skill Statement

Leadership and Teamwork

Statement: *Demonstrate leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*

Performance Element: Provide group leadership.

Measurement Criteria: *Work with others to develop and gain commitment to team goals.*

Measurement Criteria: *Motivate team members to achieve goals.*

Measurement Criteria: *Promote the full involvement and utilization of team members.*

Measurement Criteria: *Distribute responsibility and work load fairly.*

Performance Element: Collaborate with others.

Measurement Criteria: *Demonstrate commitment to and a positive attitude toward team goals.*

Measurement Criteria: *Take responsibility for shared group and individual work tasks.*

Measurement Criteria: *Complete personal share of the work.*

Measurement Criteria: *Assist team members in completing their work.*

Measurement Criteria: *Adapt effectively to changes in projects, deadline, schedules, and changes in process.*

Measurement Criteria: *Negotiate effectively to arrive at decisions.*

Measurement Criteria: *Treat people with respect.*

Measurement Criteria: *Provide feedback (e.g., praise, critique and constructive criticism).*

Measurement Criteria: *Demonstrate sensitivity to and value for diversity.*

Measurement Criteria: *Resolve conflicts.*

Measurement Criteria: *Manage stress and control emotions.*

Performance Element: Conduct and participate in meetings.

Measurement Criteria: *Develop meeting objectives and agenda.*

Measurement Criteria: *Prepare materials for leading discussion.*

Measurement Criteria: *Assemble and distribute meeting materials.*

Measurement Criteria: *Attend scheduled meetings on time.*

Measurement Criteria: *Conduct meeting to achieve objectives within scheduled time frame.*

Measurement Criteria: *Demonstrate effective communication skills.*

Measurement Criteria: *Produce and distribute meeting minutes including decisions and next steps.*

Measurement Criteria: *Provide and maintain documentation needed for compliance.*

Measurement Criteria: *Conduct and participate in accident/incident investigations.*

Performance Element: Develop plans to improve performance.

Measurement Criteria: *Use structured problem-solving process to develop improvement plans.*

Cluster Knowledge and Skill Statement

Ethics and Legal Responsibilities

Statement: *Demonstrate knowledge of and commitment to professional ethics and legal responsibilities.*

Performance Element: Distinguish between ethical and legal responsibilities.

Measurement Criteria: *Compare the similarities/differences between ethical and legal responsibilities for different roles and functions.*

Measurement Criteria: *Explain employer expectations for ethical and legal behaviors in work situations and how expectations are expressed in organizational policies and culture.*

Measurement Criteria: *Compare similarities/differences in employee practices involving personal and professional ethics.*

Measurement Criteria: *Identify both short and long term effects of an individual employee's lack of ethics or failure to comply with legal requirements.*

Measurement Criteria: *Provide examples of ethical decisions.*

Performance Element: Demonstrate awareness of legal responsibilities for different roles and functions within organizations.

Measurement Criteria: *Explain legal responsibilities of employees to comply with governmental laws and regulations.*

Measurement Criteria: *Identify personal and organizational ramifications for failure to comply with governmental laws and regulations.*

Measurement Criteria: *Explain the major government laws and regulations that define legal responsibilities within the manufacturing industry.*

Performance Element: Apply ethical reasoning to different workplace situations.

Measurement Criteria: *Evaluate alternative responses to workplace situations based on legal responsibilities and employer policies.*

Measurement Criteria: *Evaluate alternative responses to workplace situations based on personal or professional ethics.*

Measurement Criteria: *Determine and explain most appropriate response based on legal and ethical obligations.*

Performance Element: Identify strategies for responding to unethical or illegal actions of individuals and organizations.

Measurement Criteria: *Identify and explain alternative strategies for responding to unethical or illegal actions.*

Measurement Criteria: *Identify and explain best strategy.*

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Cluster Knowledge and Skill Statement

Employability and Career Development

Statement: *Explain written organizational policies, rules and procedures to help employees perform their jobs.*

Performance Element: Locate appropriate information on organizational policies in handbooks and manuals.

Measurement Criteria: *Identify the contents of various organizational publications.*

Measurement Criteria: *Determine the appropriate document (s) for specific job responsibilities and work assignments.*

Performance Element: Discuss how specific organizational policies and rules influence a specific work situation.

Measurement Criteria: *Locate and identify specific organizational policy, rule or procedure to assist with a given situation.*

Measurement Criteria: *Articulate how a specific organizational policy, rule or procedure will improve a given situation.*

Statement: *Identify and demonstrate positive work behaviors and personal qualities.*

Performance Element: Demonstrate self-discipline, self-worth, positive attitude, and integrity in a work situation.

Measurement Criteria: *Demonstrate regular attendance.*

Measurement Criteria: *Follow company dress and appearance standards.*

Measurement Criteria: *Exhibit pride in work.*

Measurement Criteria: *Demonstrate leadership and teamwork.*

Performance Element: Demonstrate flexibility and willingness to learn new knowledge and skills.

Measurement Criteria: *Exhibit ability to handle stress.*

Measurement Criteria: *Display initiative and open-mindedness.*

Measurement Criteria: *Participate in company orientation and training programs with enthusiasm.*

Measurement Criteria: *Identify progressive strategies that will impact efficiency of job.*

Performance Element: Exhibit commitment to the organization.

Measurement Criteria: *Follow established rules, regulations and policies.*

Measurement Criteria: *Explain employer/management responsibilities.*

Measurement Criteria: *Demonstrate cost effectiveness.*

Measurement Criteria: *Demonstrate time management.*

Measurement Criteria: *Complete all tasks thoroughly.*

Statement: *Develop a personal career plan to meet career goals and objectives.*

Performance Element: Develop career goal and objectives to plan future career direction.

Measurement Criteria: *Identify career that matches individual interests and aptitudes.*

Measurement Criteria: *Develop career goal with time frame.*

Measurement Criteria: *Identify goals and objectives for reaching and advancing in career.*

Cluster Knowledge and Skill Statement

Performance Element: Develop strategies to reach career objectives.

Measurement Criteria: *Write a list of strategies for achieving educational requirements.*

Measurement Criteria: *Identify strategies for obtaining employment experiences.*

Measurement Criteria: *Write a time line for achieving career goals and objectives.*

Measurement Criteria: *List alternatives and potential changes.*

Statement: Demonstrate ability to seek and apply for employment.

Performance Element: Use multiple resources to locate job opportunities.

Measurement Criteria: *Identify resources for finding employment.*

Measurement Criteria: *Analyze resources to determine those that are most appropriate for desired career.*

Measurement Criteria: *Compare job requirements with personal qualifications, interests, and aptitudes.*

Measurement Criteria: *Select job that matches personal qualifications, interests, and aptitudes.*

Performance Element: Prepare a resume and letter of application to apply.

Measurement Criteria: *Identify respective employer's submission requirements.*

Measurement Criteria: *Gather information and prepare rough draft of resume.*

Measurement Criteria: *Put resume in proper format.*

Measurement Criteria: *Write letter of application for specific job opening in correct format without error.*

Performance Element: Complete an employment application to obtain employment.

Measurement Criteria: *Gather information for application.*

Measurement Criteria: *Complete all questions on application with appropriate and honest answers.*

Measurement Criteria: *Sign and date application.*

Measurement Criteria: *Attach any supporting material required or requested.*

Measurement Criteria: *Submit full application package to employers.*

Performance Element: Interview to obtain employment.

Measurement Criteria: *Dress appropriately for interview.*

Measurement Criteria: *Exhibit professional conduct before, during and after interview.*

Measurement Criteria: *Explain your qualifications and interests clearly and concisely.*

Measurement Criteria: *Answer all questions honestly and concisely.*

Measurement Criteria: *Write follow-up letter after the interview.*

Statement: Demonstrate ability to evaluate and compare employment opportunities and accept employment.

Performance Element: Evaluate and compare employment opportunity to individual needs and career plan.

Measurement Criteria: *Identify job advantages and disadvantages.*

Measurement Criteria: *Compare job benefits to individual needs.*

Measurement Criteria: *Compare job opportunities and responsibilities to career plan.*

Performance Element: Accept or reject employment.

Measurement Criteria: *Make decision to accept or reject employment.*

Measurement Criteria: *Write acceptance or rejection letter without error.*

Measurement Criteria: *Complete employment forms upon acceptance.*

Manufacturing

Cluster Knowledge and Skill Statement

Technical Skills

Statement: *Demonstrate understanding of the basic technical skills and knowledge required for careers in manufacturing.*

Performance Element: Understand the planning and layout processes (e.g., designing, print reading, measuring) used in manufacturing.

Measurement Criteria: *Read prints and use the information to plan, lay out, and produce parts or products.*

Performance Element: Understand how materials can be processed using tools and machines.

Measurement Criteria: *Use tools and the processes of cutting, shaping, combining, forming, etc. of materials to manufacture a part or product.*

Performance Element: Understand various types of assembling processes (e.g., mechanical fastening, mechanical force, joining, fusion bonding, adhesive bonding) used in manufacturing.

Measurement Criteria: *Apply appropriate fastening or joining procedure to the design and production of a manufactured part or product.*

Performance Element: Understand finishing processes (e.g., types of finishing materials, surface preparation, methods of application) used in manufacturing.

Measurement Criteria: *Select a finishing process for a product appropriate to the job it must perform environment in which it functions, and its aesthetic appeal.*

Performance Element: Understand inspection and quality control in the manufacturing process.

Measurement Criteria: *Perform continuous on line inspections to ensure that parts or products meet design specifications.*

Section III – Pathway Knowledge and Skills

PATHWAY: Manufacturing Production Process Development

Pathway Topic: Customer Needs

Pathway KS Statement: Produce a product to satisfy customer desires.

Performance Element: Conduct in-depth investigation to identify customer needs.

Measurement Criteria: *Explain the impact of the customers' intended use of a product on every phase of the manufacturing process.*

Measurement Criteria: *Meet needs of both internal and external customers.*

Measurement Criteria: *Maintain liaison with customer contacts.*

Measurement Criteria: *Review, maintain, and communicate customer needs and specifications.*

Measurement Criteria: *Identify issues that prevent proactive handling of customer needs.*

Performance Element: Verify that needed resources are available for the production process.

Measurement Criteria: *Use work orders when handling raw materials, while setting up of tools and equipment, and when scheduling workers to maximize productivity.*

Measurement Criteria: *Properly report any discrepancies related to raw materials, tools/equipment, and workers abilities/availability.*

Measurement Criteria: *Identify consequences of not reporting discrepancies in production.*

Performance Element: Relate workers' skills to equipment management to set up equipment for the production process.

Measurement Criteria: *Evaluate workers' skills when setting up, programming, and operating equipment required for production.*

Measurement Criteria: *Make proper repairs and adjustments to equipment prior to putting into service.*

Measurement Criteria: *Verify that the first piece or production meets both product specifications and production capacities.*

Measurement Criteria: *Examine how set-up procedures are documented for repeatability.*

Measurement Criteria: *Identify possible consequences resulting from failure to meet production standards.*

Performance Element: Use process control data to monitor fabrication of the product.

Measurement Criteria: *Use process control data to indicate that the manufacturing process complies with standards.*

Measurement Criteria: *Make the manufacturing process cycle time meet customer and business needs.*

Measurement Criteria: *Identify possible consequences resulting from failure to perform operations safely.*

Measurement Criteria: *Verifying that the product meets customer specifications.*

Measurement Criteria: *Complete, maintain, and forward to proper parties product and process documentation.*

Measurement Criteria: *Verify that production operations comply with all health, safety, and environmental policies and procedures.*

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Pathway Topic: Customer Needs

Performance Element: Inspect the product to verify that it meets specifications.

Measurement Criteria: *Verify the calibration of the testing equipment.*

Measurement Criteria: *Follow the established sampling plan and inspection policies/procedures.*

Measurement Criteria: *Predict consequences of failure to identify promptly any product and production process that do not meet specifications.*

Measurement Criteria: *Complete inspection documents accurately and forward them to proper parties.*

Measurement Criteria: *Following appropriate testing/production tools and procedures.*

Measurement Criteria: *Make adjustments needed to bring the production process back into specification.*

Measurement Criteria: *Make necessary adjustment in the manufacturing process in a timely manner.*

Performance Element: Document product and process to assure formal compliance with customer requirements.

Measurement Criteria: *Write compliance documents legibly in the appropriate format and store them in a safe, secure place.*

Measurement Criteria: *Completing compliance documentation, obtain “sign off”, and forward to the proper parties.*

Measurement Criteria: *Distinguish between products that are labeled appropriately for compliance and products that are not appropriately labeled for compliance.*

Performance Element: Check for specified quantities and proper documentation to prepare a final product for shipping or distribution.

Measurement Criteria: *Package materials to meet packaging and shipping specifications (including proper labeling).*

Measurement Criteria: *Complete package documentation and customer shipping instructions to accompany the product to the next destination.*

Measurement Criteria: *Communicate product availability to the proper parties in a timely manner.*

Measurement Criteria: *Check relevant information such as quantity, destination and packaging instructions against the work order.*

Measurement Criteria: *Verify that product is correctly stored or staged for shipping.*

Measurement Criteria: *Explain the significance of following all laws and regulations related to labeling, packaging, and transport.*

Measurement Criteria: *Verify that material handling procedures are followed to prevent product damage.*

Pathway Topic: New Manufacturing Process

Pathway KS Statement: Implement new manufacturing process.

Performance Element: Research the new manufacturing process.

Measurement Criteria: *Review current processes completely to determine any changes that are needed to meet customer requirements.*

Measurement Criteria: *Provide research to correct parties to confirm*

Pathway Topic: New Manufacturing Process

manufacturability.

Measurement Criteria: *Confirm resource requirements accurately.*

Measurement Criteria: *Review project materials and processes thoroughly to establish cost estimates.*

Measurement Criteria: *Hold customer meetings to confirm customer needs when appropriate.*

Performance Element: **Create standard operating procedures (SOPs) for new process.**

Measurement Criteria: *Identify new tooling and materials.*

Measurement Criteria: *Specify new training where required.*

Measurement Criteria: *Document new standard operating procedures according to company procedure.*

Measurement Criteria: *Make sure that correct parties review new standard operating procedures.*

Measurement Criteria: *Verify that standard operating procedures meet customer needs including cost effectiveness.*

Performance Element: **Develop new tooling and fixtures.**

Measurement Criteria: *Fabricate new tooling and fixtures according to design specifications.*

Measurement Criteria: *Properly document new tooling and fixtures development process with new material suggestions noted.*

Measurement Criteria: *Verify that new tooling and fixtures increase efficiency and cost effectiveness of the process.*

Measurement Criteria: *Verify that new tooling and fixtures result in improvement of product quality and a decrease in nonconformance.*

Performance Element: **Set up and program equipment for new processes.**

Measurement Criteria: *Verify that new equipment or process works to specification and runs efficiently.*

Measurement Criteria: *Program equipment to maximize output and quality.*

Measurement Criteria: *Make sure that equipment program is concise and understandable by others.*

Measurement Criteria: *Set up equipment or process in a timely way.*

Measurement Criteria: *Continue test runs until product specifications and efficiency levels are met.*

Measurement Criteria: *Download equipment program and store correctly.*

Performance Element: **Schedule and test new processes.**

Measurement Criteria: *Verify that schedules for testing new processes are complete and detailed.*

Measurement Criteria: *Follow standard procedures when making a testing schedule.*

Measurement Criteria: *Conduct review on the new process to determine readiness for implementation.*

Measurement Criteria: *Verify that testing is specific and done on a timely basis.*

Measurement Criteria: *Include data on usefulness and efficiency with documentation of test results.*

Measurement Criteria: *Obtain proper approvals to implement the changes in process*

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Pathway Topic: New Manufacturing Process

determined by the test results.

Measurement Criteria: *Use new or updated processes according to specifications.*

Performance Element: **Monitor production performance data for new processes.**

Measurement Criteria: *Use up-to-date charts and available statistics to properly document monitoring.*

Measurement Criteria: *Used the proper test equipment to monitor production performance.*

Measurement Criteria: *Perform the appropriate tests based on customer or manufacturer specifications or company policy.*

Measurement Criteria: *Communicate problems effectively to proper parties.*

Measurement Criteria: *Use proper measurements.*

Performance Element: **Train employees on new processes.**

Measurement Criteria: *Make sure that training covers appropriate material and is delivered clearly.*

Measurement Criteria: *Make sure that employees meet standards on newly trained skills.*

Measurement Criteria: *Evaluate training.*

Measurement Criteria: *Use evaluations to improve training.*

Measurement Criteria: *Verify that training records show training has been delivered.*

Measurement Criteria: *Use training to establish certification.*

Performance Element: **Prepare documentation on new processes.**

Measurement Criteria: *Make sure that documentation is complete, accurate, and legible.*

Measurement Criteria: *Use company procedures to complete documentation in a timely way.*

Measurement Criteria: *File documentation properly.*

Measurement Criteria: *Solicit input from workers to ensure that documentation is useful.*

Pathway Topic: Safety

Pathway KS Statement: **Maintain a safe and productive workplace.**

Performance Element: **Follow local, federal and company regulations to perform environmental and safety inspections.**

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: **Participate in emergency response teams to perform emergency drills.**

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Pathway Topic: Safety

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: Identify unsafe conditions and take corrective action.

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: Provide safety orientation to train other employees in safe practices and emergency procedures.

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.*

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Quality Improvement

Pathway KS Statement: Maintain quality and implement continuous improvement processes.

Performance Element: Perform periodic internal quality audit activities.

Measurement Criteria: *Complete all audit forms correctly in a timely manner.*

Measurement Criteria: *Forward forms to the correct parties.*

Measurement Criteria: *Verify that audit data is relevant and correct.*

Measurement Criteria: *Make sure that conformance to quality standards are properly assessed and documented.*

Measurement Criteria: *Include observation of operation in audit when appropriate to ensure performance meets specifications.*

Measurement Criteria: *Follow company and other required schedules and procedures to perform audit.*

Performance Element: Check calibration of gauges and other data collection equipment.

Measurement Criteria: *Follow specifications to implement calibration schedule.*

Measurement Criteria: *Review documents and use thorough careful observation to check instrument certification during use.*

Measurement Criteria: *Recalibrate instruments that are out of calibration or refer*

Pathway Topic: Quality Improvement

them to the appropriate parties for recalibration or repairs immediately.

Performance Element: Suggest continuous improvements.

Measurement Criteria: *Use observations and data analysis to generate potential improvements.*

Measurement Criteria: *Verify that suggestions communicate measurable and data-driven benefits to the company, its customers, and employees.*

Measurement Criteria: *Use proper procedures and documentation to make suggestions.*

Measurement Criteria: *Make sure that all suggestions show that all data was reviewed prior to making recommendation.*

Performance Element: Inspect materials at all stages of process to determine quality or condition.

Measurement Criteria: *Follow schedule and procedures to complete sampling and inspection.*

Measurement Criteria: *Select and use inspection tools and procedures correctly.*

Measurement Criteria: *Inspect materials against correct specifications.*

Measurement Criteria: *Identify materials that do not meet specification correctly.*

Measurement Criteria: *Take corrective action on out-of-specification material.*

Measurement Criteria: *Document inspection results properly.*

Measurement Criteria: *Report inspection results to correct parties.*

Performance Element: Document the results of quality tests.

Measurement Criteria: *Check data forms to ensure that they are complete and accurate.*

Measurement Criteria: *Make sure that information is evaluated and interpreted correctly.*

Measurement Criteria: *Forward data to correct parties.*

Measurement Criteria: *Select and use correct analytical tools properly.*

Performance Element: Make adjustments to restore or maintain quality.

Measurement Criteria: *Make sure that appropriate corrective actions are identified and approvals received when needed.*

Measurement Criteria: *Make adjustments to eliminate deviations and bring the process back into control.*

Measurement Criteria: *Make adjustments in a timely manner.*

Measurement Criteria: *Document adjustments properly.*

Pathway Topic: Communications

Pathway KS Statement: Communicate with co-workers and/or external customers to ensure production meets business requirements.

Performance Element: Use speaking and presentation skills to effectively communicate safety, training, and job-specific needs.

Measurement Criteria: *Ensure that safety issues are understood and safety practices are being used.*

Measurement Criteria: *Explain the significance of on-the-job issues and concerns*

Pathway Topic: Communications

being discussed and quickly resolved.

Measurement Criteria: *Identify current and future training issues in a timely way.*

Measurement Criteria: *Verify that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Be clear and relevant with communications related to safety, training, and job-specific needs.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back safety, training, and job-specific issues to original communicator.*

Measurement Criteria: *Track and document communications related to safety, training, and job-specific needs.*

Performance Element: **Be timely and accurate in communicating material specifications and delivery schedules.**

Measurement Criteria: *Make sure that communication reflects knowledge of material specifications.*

Measurement Criteria: *Communicate delivery schedules clearly.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication is clear and relevant to material and delivery issues.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back material and delivery issues to original communicator.*

Measurement Criteria: *Track and document material specifications and delivery schedules.*

Performance Element: **Communicate production requirements and product specifications.**

Measurement Criteria: *Make sure that communication reflects knowledge of production requirements, levels, and product specifications.*

Measurement Criteria: *Initiate communication to meet production requirements, product specifications, or other customer or business needs cross-functionally as required.*

Measurement Criteria: *Notify all parties of production issues and problems in a timely way.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication to production and products is clear and relevant.*

Measurement Criteria: *Evaluate, track, and report production and product issues back to original communicator.*

Measurement Criteria: *Track and document communications related to production requirements and product specifications as appropriate.*

Pathway Topic: Continuous Improvement

Pathway Topic: Continuous Improvement

Pathway KS Statement: *Suggest and/or implement continuous improvement actions.*

Performance Element: *Analyze data to identify potential problems.*

Measurement Criteria: *Apply quality tools and techniques properly to determine the source of potential quality problems.*

Measurement Criteria: *Continuously reassess process capability.*

Measurement Criteria: *Validate process and product measurement systems.*

Measurement Criteria: *Adjust process and product measurement systems as required.*

Measurement Criteria: *Report quality data to appropriate parties in a timely manner.*

Performance Element: *Monitor process capability.*

Measurement Criteria: *Make sure processes meet manufacturer and other quality specifications.*

Measurement Criteria: *Make sure processes meet company or customer capability requirements.*

Measurement Criteria: *Make sure that process meets on-time delivery needs of the customer.*

Measurement Criteria: *Report analyzed process capability data according to procedures.*

Measurement Criteria: *Use results of capability studies to adjust product or process.*

Measurement Criteria: *Distribute results of capability studies to appropriate parties.*

Performance Element: *Monitor customer satisfaction.*

Measurement Criteria: *Use appropriate data to measure customer satisfaction.*

Measurement Criteria: *Implement surveys and other customer data techniques in a timely manner.*

Measurement Criteria: *Report returned goods to appropriate parties for review.*

Measurement Criteria: *Include vendor certifications with customer documentation.*

Measurement Criteria: *Document on-time delivery data appropriately.*

Measurement Criteria: *Review field failure and product life data in a timely manner.*

Performance Element: *Measure and record product and process outcomes.*

Measurement Criteria: *Use proper format to record product and process outcomes within the specified timeframe.*

Measurement Criteria: *Use appropriate quality analysis and statistical techniques to analyze performance.*

Measurement Criteria: *Report outcomes to all appropriate parties.*

Performance Element: *Participate in making new work procedures.*

Measurement Criteria: *Translate recommendations for continuous improvement into new work instructions.*

Measurement Criteria: *Publish work instructions in appropriate format.*

Measurement Criteria: *Distribute work instruction according to standard procedures.*

Measurement Criteria: *Discuss new work procedures or instructions with all stakeholders to ensure support for improvements.*

Performance Element: *Implement approved recommendations.*

Measurement Criteria: *Make recommendations for continuous improvement that are*

Pathway Topic: Continuous Improvement

clear, concise, and based on data trends and patterns.

Measurement Criteria: *Make recommendations in such a way that draws support for process improvement.*

Measurement Criteria: *Verify that all stakeholders understand their role in process improvement changes.*

Measurement Criteria: *Document accepted process improvements before translating into revised work processes and procedures.*

Performance Element: **Check that final product meets customer and business needs.**

Measurement Criteria: *Verify that final test results meet customer requirements.*

Measurement Criteria: *Produce product within company time and cost parameters.*

Measurement Criteria: *Take action to minimize negative customer feedback on quality issues.*

Pathway Topic: New Product Development

Pathway KS Statement: **Produce new product to meet customer needs.**

Performance Element: **Conduct research for new products.**

Measurement Criteria: *Document research and test results properly.*

Measurement Criteria: *Complete testing, including trial runs, on new products and services.*

Measurement Criteria: *Use research to modify production processes as appropriate.*

Measurement Criteria: *Provide research on new products to the customer for approval before producing new product.*

Performance Element: **Obtain required supplies.**

Measurement Criteria: *Make correct supplies available at workstation.*

Measurement Criteria: *Communicate inventory shortages and defects effectively to correct parties.*

Measurement Criteria: *Check supplies against work order.*

Measurement Criteria: *Review supply records and history completely.*

Performance Element: **Execute process to produce new product.**

Measurement Criteria: *Follow standard operating procedures.*

Measurement Criteria: *Meet production timeline.*

Measurement Criteria: *Continually check product for quality.*

Measurement Criteria: *Analyze production sequence for capability and efficiency.*

Measurement Criteria: *Perform production sequence safely.*

Measurement Criteria: *Deliver product that meets specification to next production station in a timely way.*

Performance Element: **Inspect product for deviations from specifications.**

Measurement Criteria: *Evaluate product quality against specifications.*

Measurement Criteria: *Communicate deviations from specifications effectively to correct parties.*

Measurement Criteria: *Handle out-of-specification products properly according to company procedures.*

Measurement Criteria: *Document inspections properly according to company procedures.*

Pathway Topic: New Product Development

Measurement Criteria: *Conduct inspections continuously.*

Performance Element: **Evaluate prototypes for manufacturability.**

Measurement Criteria: *Pilot test prototype for manufacturability thoroughly.*

Measurement Criteria: *Check manufacturing plans for the prototype against existing resources.*

Measurement Criteria: *Communicate results of the evaluation effectively to correct parties in a timely way.*

Measurement Criteria: *Document evaluation properly according to company procedures.*

Measurement Criteria: *Solicit feedback from operators and accurately document it.*

Measurement Criteria: *Verify that resulting product meets customer requirements and specifications.*

Performance Element: **Solve production process problems.**

Measurement Criteria: *Document problems and suggested solutions properly.*

Measurement Criteria: *Communicate problems and solutions effectively to the correct parties.*

Measurement Criteria: *Solve problems with minimum downtime.*

Measurement Criteria: *Minimize negative impact on other workstations and the overall process while solving problems.*

Measurement Criteria: *Implement approved solutions efficiently and effectively.*

Performance Element: **Deliver finished product to next stage in production process.**

Measurement Criteria: *Deliver product according to schedule and customer delivery timelines.*

Measurement Criteria: *Include complete shipping records and documentation with the product.*

Measurement Criteria: *Notify customers of product status properly.*

Measurement Criteria: *Label package properly.*

Pathway Topic: Production Process

Pathway KS Statement: **Improve production processes.**

Performance Element: **Conduct research for new products.**

Measurement Criteria: *Collect all relevant data for the audit in a timely way.*

Measurement Criteria: *Use past production data and current production goals to evaluate audit data.*

Measurement Criteria: *Perform audits according to the proper schedule.*

Measurement Criteria: *Communicate discrepancies to the proper parties in a timely way.*

Measurement Criteria: *Make sure that audit report is complete including all supporting data and analyses.*

Measurement Criteria: *Submit audit report according to company procedure.*

Measurement Criteria: *Verify that problems are identified because audit results are used in a timely way.*

Performance Element: **Propose changes to improve products and processes.**

Measurement Criteria: *Make suggestions for improvement in a timely way.*

Pathway Topic: Production Process

Measurement Criteria: *Verify that product quality improves.*

Measurement Criteria: *Verify that production time decreases.*

Measurement Criteria: *Follow-up on proposals containing supporting materials for justifications with correct parties.*

Measurement Criteria: *Use company procedures to make proposals.*

Measurement Criteria: *Evaluate suggestions for effectiveness.*

Measurement Criteria: *Verify that suggestions meet quality and safety standards.*

Measurement Criteria: *Document proposals properly.*

Measurement Criteria: *Implement proposed changes.*

Performance Element: Develop production improvement goals.

Measurement Criteria: *Set realistic and attainable goals.*

Measurement Criteria: *Make sure that goals meet technical standards.*

Measurement Criteria: *Write goals that are specific, simple, understandable, and measurable.*

Measurement Criteria: *Verify that goals are consistent with business objectives.*

Measurement Criteria: *Document goals properly according to company procedures.*

Measurement Criteria: *Communicate goals to correct parties in a timely way.*

Performance Element: Inspect product for deviations from customer and product standard(s).

Measurement Criteria: *Compare product to the correct customer and company standards.*

Measurement Criteria: *Perform inspections according to company procedures in a timely way.*

Measurement Criteria: *Verify that inspections completely and accurately identify deviation from specifications.*

Measurement Criteria: *Document inspections properly according to customer specifications and company procedures.*

Measurement Criteria: *Conduct inspections continuously to ensure that standards are maintained throughout the process.*

Measurement Criteria: *Handle out-of-compliance product correctly according to company procedure.*

Performance Element: Correct product or process problems.

Measurement Criteria: *Make corrections immediately upon identification of a problem.*

Measurement Criteria: *Make corrections according to company procedures.*

Measurement Criteria: *Identify underlying or root cause of problem.*

Measurement Criteria: *Address underlying or root cause of problem.*

Measurement Criteria: *Test corrective actions to determine if the problem is solved.*

Measurement Criteria: *Document problems and corrections properly.*

Measurement Criteria: *Communicate problems and corrections effectively to correct parties.*

Measurement Criteria: *Handle out-of-compliance product correctly according to company procedure.*

Measurement Criteria: *Perform any rework or remediation needed to bring product into specifications in a timely way.*

PATHWAY: Production

Pathway Topic: Quality Process

Pathway KS Statement: **Correct processes to assure that products meet quality standards.**

Performance Element: **Communicate quality problems.**

Measurement Criteria: *Review quality problems with production operators.*

Measurement Criteria: *Communicate quality problems promptly to appropriate parties.*

Measurement Criteria: *Use established processes to document quality problems.*

Measurement Criteria: *Summarize defect trends and report them to appropriate parties.*

Performance Element: **Suggest or perform corrective actions to correct quality problems.**

Measurement Criteria: *Make minor quality issues or adjustments immediately.*

Measurement Criteria: *Document quality issues or adjustments properly.*

Measurement Criteria: *Make sure that recommendations for action are clear and concise, and supported by data.*

Measurement Criteria: *Make recommendations in a timely way to appropriate parties.*

Measurement Criteria: *Indicate that follow-up activities indicate that corrective action was taken.*

Measurement Criteria: *Document product quality following corrective action.*

Performance Element: **Determine appropriate action for sub-standard product.**

Measurement Criteria: *Execute quality control procedures to catch sub-standard products promptly within the defined quality systems.*

Measurement Criteria: *Document decisions regarding sub-standard products for future retrieval.*

Measurement Criteria: *Process sub-standard products appropriately.*

Measurement Criteria: *Distribute documentation required for customers to appropriate parties.*

Performance Element: **Record process outcomes and trends to identify trends and recognize needs.**

Measurement Criteria: *Maintain records on quality process to appropriate standards.*

Measurement Criteria: *Chart outcomes of quality processes according to appropriate methods and standards.*

Measurement Criteria: *Check data on quality processes for accuracy.*

Measurement Criteria: *Analyze quality process performance data to identify trends.*

Measurement Criteria: *Report quality process performance data to appropriate parties in a timely way.*

Performance Element: **Identify and report performance and training issues to assess their affect on quality.**

Measurement Criteria: *Identify performance and training issues related to quality in a timely manner.*

Measurement Criteria: *Take corrective action for quality issues impacting the health or safety of workers.*

Pathway Topic: Quality Process

Performance Element: Implement closed-loop corrective action to provide for ongoing production feedback.

Measurement Criteria: Document evidence of corrective action in a timely manner.

Measurement Criteria: Report change resulting from the corrective action to appropriate parties in the correct format.

Measurement Criteria: Use spot checks to verify implementation of the corrective action.

Measurement Criteria: Store reports properly for the required amount of time.

Measurement Criteria: Perform ongoing audits to optimize the outcomes of the corrective actions.

Measurement Criteria: Examine previous documentation on similar process issues to identify possible solutions.

Pathway Topic: Maintenance

Pathway KS Statement: Maintain equipment, tools and workstations.

Performance Element: Contact proper people and assure supplies are available to perform preventive maintenance and routine repair.

Measurement Criteria: Verify that preventive maintenance schedule is in place and checked as appropriate.

Measurement Criteria: Verify that preventive maintenance is performed to schedule and documented completely in a timely manner.

Measurement Criteria: Use the right procedures and forms to communicate repair needs to the correct parties.

Measurement Criteria: Verify that necessary repair work is checked through follow-up.

Measurement Criteria: Have necessary supplies available to perform preventive maintenance.

Measurement Criteria: Predict the results of failing to effectively communicate the preventive maintenance schedule, documentation, equipment needs, and outstanding repairs from shift-to-shift, to team members, to managers, and to others as required.

Measurement Criteria: Follow all safety regulations when doing repairs.

Performance Element: Monitor equipment indicators to ensure it is operating correctly.

Measurement Criteria: Compare equipment performance to optimal equipment operations on a regular schedule.

Measurement Criteria: Investigate and correct abnormal equipment conditions in a timely manner.

Measurement Criteria: Monitored equipment to ensure that the corrective action solved the problem.

Measurement Criteria: Keep documentation of equipment repair history complete, up-to-date, and accurate.

Performance Element: Provide documented training to assure maintenance activities meet company regulations.

Measurement Criteria: Conduct training in an effective and appropriate manner.

Measurement Criteria: Make documented preventive maintenance training materials

Pathway Topic: Maintenance

readily available.

Measurement Criteria: *Keep training records updated and readily available.*

Measurement Criteria: *Examine the relevancy of training for use of equipment, tools, materials, and processes at the workstation continuously.*

Measurement Criteria: *Provide cross-training when appropriate.*

Measurement Criteria: *Verify that training and training documentation meet all company and regulatory requirements.*

Performance Element: **Perform daily housekeeping to maintain production schedules and provide a safe working environment.**

Measurement Criteria: *Store tools and materials safely in proper locations.*

Measurement Criteria: *Identify and report unsafe conditions promptly.*

Measurement Criteria: *Take corrective action to correct unsafe conditions.*

Measurement Criteria: *Keep workstations clean and clear of safety hazards.*

Measurement Criteria: *Verify that scheduled housekeeping inspections are passed.*

Measurement Criteria: *Organize workstations to maximize efficiency.*

Measurement Criteria: *Verify that safety equipment is present and in proper working order.*

Pathway Topic: Safety

Pathway KS Statement: **Maintain a safe and productive workplace.**

Performance Element: **Follow local, federal and company regulations to perform environmental and safety inspections.**

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: **Participate in emergency response teams to perform emergency drills.**

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: **Identify unsafe conditions and take corrective action.**

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Pathway Topic: Safety

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: **Provide safety orientation to train other employees in safe practices and emergency procedures.**

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.*

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Quality Improvement

Pathway KS Statement: **Employ audits and inspections to maintain quality and continuous improvement processes.**

Performance Element: **Use company audit procedures to perform periodic internal quality audits.**

Measurement Criteria: *Perform audits in accordance with company and other required schedules and procedures.*

Measurement Criteria: *Complete all audit forms correctly in a timely manner and forward to the correct parties.*

Measurement Criteria: *Verify that audit data that is relevant and correct.*

Measurement Criteria: *Verify that conformance to quality standards are properly assessed and documented.*

Measurement Criteria: *Include observation of operations to ensure performances meet specifications when appropriate.*

Performance Element: **Check calibration of gauges and other data collection equipment.**

Measurement Criteria: *Implement calibration schedule according to specifications.*

Measurement Criteria: *Make thorough careful observations and review documentation to check instrument certification.*

Measurement Criteria: *Recalibrate out-of-caliber instruments immediately or refer them to the appropriate parties for recalibration or repairs.*

Performance Element: **Suggest improvements to accomplish continuous improvement.**

Measurement Criteria: *Use observation and data analysis to generate potential improvements.*

Measurement Criteria: *Communicate suggestions that are measurable and have data-driven benefits to the company, its customers, and employees.*

Measurement Criteria: *Use proper procedures and documentation to make suggestions.*

Measurement Criteria: *Assure that all data is reviewed prior to making suggestions.*

Performance Element: **Inspect materials at all states of process to determine quality**

Manufacturing

Pathway Topic: Quality Improvement

or condition.

Measurement Criteria: *Sample and inspect in accordance with the schedule and procedures.*

Measurement Criteria: *Select correct inspection tools and procedures and use them correctly.*

Measurement Criteria: *Inspect materials against correct specifications.*

Measurement Criteria: *Identify materials not meeting specifications correctly.*

Measurement Criteria: *Take corrective action on out-of-specification material.*

Measurement Criteria: *Document inspection results properly and report them to the correct parties in a timely manner.*

Performance Element: **Use reliable data to document the results of quality testing.**

Measurement Criteria: *Check data forms for completeness and accuracy.*

Measurement Criteria: *Evaluate and interpret information correctly.*

Measurement Criteria: *Forward data to correct parties.*

Measurement Criteria: *Select and use the correct analytical tools properly.*

Performance Element: **Make adjustments to restore or maintain quality.**

Measurement Criteria: *Identify appropriate correction actions and make sure that approvals are received when needed.*

Measurement Criteria: *Make adjustments to eliminate deviations and bring the process back into control.*

Measurement Criteria: *Make adjustments and document them in a timely manner.*

Pathway Topic: Communications

Pathway KS Statement: **Communicate with co-workers and/or external customers to ensure production meets business requirements.**

Performance Element: **Use speaking and presentation skills to effectively communicate safety, training, and job-specific needs.**

Measurement Criteria: *Ensure that safety issues are understood and safety practices are being used.*

Measurement Criteria: *Explain the significance of on-the-job issues and concerns being discussed and quickly resolved.*

Measurement Criteria: *Identify current and future training issues in a timely way.*

Measurement Criteria: *Verify that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Be clear and relevant with communications related to safety, training, and job-specific needs.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back safety, training, and job-specific issues to original communicator.*

Measurement Criteria: *Track and document communications related to safety, training, and job-specific needs.*

Performance Element: **Be timely and accurate in communicating material specifications and delivery schedules.**

Measurement Criteria:

Pathway Topic: Communications

Make sure that communication reflects knowledge of material specifications.

Measurement Criteria: *Communicate delivery schedules clearly.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication is clear and relevant to material and delivery issues.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back material and delivery issues to original communicator.*

Measurement Criteria: *Track and document material specifications and delivery schedules.*

Performance Element: **Communicate production requirements and product specifications.**

Measurement Criteria: *Make sure that communication reflects knowledge of production requirements, levels, and product specifications.*

Measurement Criteria: *Initiate communication to meet production requirements, product specifications, or other customer or business needs cross-functionally as required.*

Measurement Criteria: *Notify all parties of production issues and problems in a timely way.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication to production and products is clear and relevant.*

Measurement Criteria: *Evaluate, track, and report production and product issues back to original communicator.*

Measurement Criteria: *Track and document communications related to production requirements and product specifications as appropriate.*

Pathway Topic: Work Teams

Pathway KS Statement: **Coordinate work teams to produce product.**

Performance Element: **Provide training to other employees.**

Measurement Criteria: *Provide cross training as appropriate.*

Measurement Criteria: *Assess training needs on a regular basis.*

Measurement Criteria: *Identify new requirements and training issues.*

Measurement Criteria: *Use varied approaches to achieve training goals.*

Measurement Criteria: *Document training outcomes.*

Performance Element: **Set team goals to enhance performance.**

Measurement Criteria: *Make goals specific, measurable, and achievable.*

Measurement Criteria: *Align team goals to customer and business needs.*

Measurement Criteria: *Focus team goals to meet team objectives.*

Measurement Criteria: *Document team goals and share information with all parties.*

Performance Element: **Make job assignments to avail the use of the best personnel in**

Pathway Topic: Work Teams

key assignments.

Measurement Criteria: *Make job assignments to match the skills needed for the work to be done and to maximize the use of available skills.*

Measurement Criteria: *Make job assignments to ensure that business and customer needs are met.*

Measurement Criteria: *Confirm that workers are notified of assignments effectively.*

Performance Element: **Coordinate workflow with team members and other work groups.**

Measurement Criteria: *Make sure that production schedules are met effectively.*

Measurement Criteria: *Notify team members of schedule requirements in a timely way.*

Measurement Criteria: *Make sure that production workflow runs efficiently.*

Measurement Criteria: *Take necessary action to minimize downtime.*

Measurement Criteria: *Explain the significance of relationships with others in facilitating workflow.*

Measurement Criteria: *Verify that workers actively participate in meetings and problem-solving groups.*

Pathway Topic: Equipment Safety

Pathway KS Statement: **Ensure that equipment is being used safely in the workplace.**

Performance Element: **Train others to use equipment safely.**

Measurement Criteria: *Give new operators a complete orientation of equipment.*

Measurement Criteria: *Make sure that all important information regarding equipment safety is communicated clearly and effectively.*

Measurement Criteria: *Make sure that maintenance workers obtain certification to train others in technical skills and knowledge where applicable.*

Measurement Criteria: *Make suggestions regarding training materials and content to appropriate parties.*

Measurement Criteria: *Use evaluations and feedback to improve training materials and methods.*

Measurement Criteria: *Make sure trainees have the correct tools to do the job during training.*

Measurement Criteria: *Conduct post-training evaluation to assure that workers can operate equipment safely.*

Measurement Criteria: *Use training and facilitation techniques appropriate for the audience.*

Measurement Criteria: *Document the quality and effectiveness of training appropriately.*

Performance Element: **Suggest processes and procedures to support safety and effectiveness in the work environment.**

Measurement Criteria: *Consult health and safety representatives to develop suggestions.*

Measurement Criteria: *Solicit operator feedback for use in creating a safer, more effective work environment.*

Pathway Topic: Equipment Safety

Measurement Criteria: *Make sure suggestions for training improvement are documented and sent to the appropriate parties.*

Measurement Criteria: *Make sure that content of suggestions addresses safety, quality, and productivity issues.*

Performance Element: **Fulfill safety and health requirements for maintenance, installation, and repair.**

Measurement Criteria: *Make regular safety communications to all employees.*

Measurement Criteria: *Review job safety analyses regularly according to company policy.*

Measurement Criteria: *Follow hazardous materials procedures and policies such as Material Safety Data Sheet and “right to know” accurately.*

Measurement Criteria: *Perform environmental testing of workplace on a regular basis as required by company policy or regulation.*

Measurement Criteria: *Audit equipment to ensure there are no by-passes of safety guards.*

Measurement Criteria: *Verify that regulatory and company safety procedures are followed including lock-out & tag-out, confined space, and ergonomics.*

Measurement Criteria: *Follow good housekeeping procedures.*

Measurement Criteria: *Verify that safety and personal protective equipment is available, performs correctly, and has current certification.*

Performance Element: **Monitor equipment and operator performance to assure workplace safety and compliance with both company and national regulations.**

Measurement Criteria: *Perform monitoring responsibilities regularly.*

Measurement Criteria: *Report out-of-compliance or unsafe conditions immediately.*

Measurement Criteria: *Take corrective action on out-of-compliance or unsafe conditions.*

Measurement Criteria: *Check equipment to ensure it is operating according to specifications.*

Measurement Criteria: *Check tools for compliance with specifications.*

Measurement Criteria: *Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables.*

Measurement Criteria: *Gather information on equipment use from operators to reveal existing or potential problems.*

Measurement Criteria: *Adjust equipment and processes as required.*

Measurement Criteria: *Document all monitoring data accurately.*

Pathway Topic: Customer Needs

Pathway KS Statement: **Produce a product to satisfy customer desires.**

Performance Element: **Conduct in-depth investigation to identify customer needs.**

Measurement Criteria: *Meet those needs that differ between internal and external customers as well as those that both share.*

Measurement Criteria: *Maintain contact with customer about the product aspects and its specifications to ensure thorough understanding of needs.*

Measurement Criteria: *Review, maintain, and communicate customer needs and*

Pathway Topic: Customer Needs

specifications.

Measurement Criteria: *Address issues preventing customer needs from being met proactively.*

Performance Element: **Verify that needed resources are available for the production process.**

Measurement Criteria: *Use work orders when handling raw materials, while setting up of tools and equipment, and when scheduling workers to maximize productivity.*

Measurement Criteria: *Report any discrepancies related to raw materials, tools/equipment, and workers abilities/availability properly.*

Measurement Criteria: *Identify consequences of not reporting discrepancies in production.*

Performance Element: **Set up equipment for the production process.**

Measurement Criteria: *Make proper repairs and adjustments to equipment prior to putting into service.*

Measurement Criteria: *Verify that set-up meets process specifications of both internal and external customers.*

Measurement Criteria: *Verify that the first piece or production meets both product specifications and production capacities.*

Measurement Criteria: *Document set-up procedures to ensure repeatability.*

Measurement Criteria: *Identify possible consequences resulting from failure to meet ergonomic and other relevant health, safety, and environmental standards.*

Performance Element: **Use process control data to monitor fabrication of the product.**

Measurement Criteria: *1. ☐ Use process control data to indicate that the manufacturing process complies with standards.*

Measurement Criteria: *2. ☐ Make the manufacturing process cycle time meet customer and business needs.*

Measurement Criteria: *3. ☐ Identify possible consequences resulting from failure to perform operations safely.*

Measurement Criteria: *4. ☐ Verify that the product meets customer specifications.*

Measurement Criteria: *5. ☐ Complete, maintain, and forward product and process documentation to proper parties.*

Measurement Criteria: *6. ☐ Verify that production operations comply with all health, safety, and environmental policies and procedures.*

Performance Element: **Inspect the product to verify that it meets specifications.**

Measurement Criteria: *Verify the calibration of the testing equipment.*

Measurement Criteria: *Follow the established sampling plan and inspection policies/procedures.*

Measurement Criteria: *Identify product and production process that do not meet specifications promptly.*

Measurement Criteria: *Complete inspection documents accurately and forward them to proper parties.*

Measurement Criteria: *Follow appropriate testing/production tools and procedures.*

Measurement Criteria: *Identify and communicate adjustments needed to bring the*

Pathway Topic: Customer Needs

production process back into specification.

Measurement Criteria: *Make necessary adjustment in the manufacturing process in a timely manner.*

Performance Element: **Document product and process to assure formal compliance with customer requirements.**

Measurement Criteria: *Write compliance documents legibly in the appropriate format and store them in a safe, secure place.*

Measurement Criteria: *Complete compliance documentation, obtain “sign off,” and forward to the proper parties.*

Measurement Criteria: *Label products for compliance and non-compliance appropriately.*

Performance Element: **Check for specified quantities and proper documentation to prepare a final product for shipping or distribution.**

Measurement Criteria: *Package materials to meet packaging and shipping specifications (including proper labeling).*

Measurement Criteria: *Complete package documentation and customer shipping instructions to accompany the product to the next destination.*

Measurement Criteria: *Communicate product availability to the proper parties in a timely manner.*

Measurement Criteria: *Check relevant information such as quantity, destination and packaging instructions against the work order.*

Measurement Criteria: *Verify that product is correctly stored or staged for shipping.*

Measurement Criteria: *Explain the significance of following all laws and regulations related to labeling, packaging, and transport.*

Measurement Criteria: *Verify that material handling procedures are followed to prevent product damage.*

PATHWAY: Maintenance, Installation & Repair

Pathway Topic: Safety

Pathway KS Statement: Maintain a safe and productive workplace.

Performance Element: Follow local, federal and company regulations to perform environmental and safety inspections.

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: Participate in emergency response teams to perform emergency drills.

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: Identify unsafe conditions and take corrective action.

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: Provide safety orientation to train other employees in safe practices and emergency procedures.

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.*

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Communication

Pathway KS Statement: Communicate with others to ensure that maintenance and repairs meet business needs.

Performance Element: Educate others about benefits of predictive and preventive

Pathway Topic: Communication

maintenance.

Measurement Criteria: *Use various techniques to clearly communicate the goals and benefits of predictive and preventive maintenance.*

Measurement Criteria: *Include information on operator responsibility for predictive and preventive maintenance in education activities.*

Measurement Criteria: *Follow company procedures for providing education regularly.*

Measurement Criteria: *Make sure that education of production schedulers and managers promotes their understanding of the priorities and benefits of predictive and preventive maintenance.*

Performance Element: **Consult with others to set repair and maintenance priorities and schedule.**

Measurement Criteria: *Make sure all parties agree on priorities, scheduling conflicts, and task associated with repair and maintenance prior to shutdown.*

Measurement Criteria: *Resolve repair and maintenance scheduling conflicts with all appropriate parties.*

Measurement Criteria: *Use project management tools and feedback where applicable.*

Measurement Criteria: *Accurately take staffing requirements into account.*

Measurement Criteria: *Solicit operator input and consider it appropriately.*

Measurement Criteria: *Give operators appropriate lead-time when notifying them that maintenance is scheduled.*

Measurement Criteria: *Respond to reports of critical problems in a timely way.*

Performance Element: **Communicate maintenance and repair resource needs.**

Measurement Criteria: *Hold a meeting with stakeholders to determine the timetable, roles, parts, and equipment needs during the pre-planning process.*

Measurement Criteria: *Place resource requests with the appropriate parties.*

Measurement Criteria: *Coordinate with other departments to ensure all resources are on hand, access to equipment is available as needed, and disruptions to the production line are minimized.*

Performance Element: **Prepare maintenance and repair logs for shift-to-shift communication.**

Measurement Criteria: *Complete documentation in a timely way.*

Measurement Criteria: *Clearly communicate all important information to the next shift.*

Measurement Criteria: *Submit repair report and preventive maintenance reschedule on time.*

Measurement Criteria: *Make documentation accessible to all appropriate parties.*

Measurement Criteria: *Clearly communicate status reports from shift-to-shift.*

Performance Element: **Suggest ways to prevent future equipment malfunctions.**

Measurement Criteria: *Make suggestions to appropriate parties.*

Measurement Criteria: *Make suggestions based on appropriate and accurate data or observations made during repairs.*

Measurement Criteria: *Document suggestions properly and include all supportive*

Pathway Topic: Communication

materials.

Measurement Criteria: *Submit suggestions for improvements accurately and on time.*

Measurement Criteria: *Notify proper authorities fast enough to permit them to correct an urgent problem.*

Pathway Topic: Hands-On Knowledge

Pathway KS Statement: **Maintain hands-on knowledge of equipment operation to identify maintenance needs.**

Performance Element: **Observe equipment operation during normal operating cycle to identify potential problems.**

Measurement Criteria: *Perform observations of equipment regularly.*

Measurement Criteria: *Report all unusual behaviors or unsafe conditions immediately to appropriate personnel.*

Measurement Criteria: *Document all aspects of equipment operations.*

Measurement Criteria: *Make sure that all safety requirements are in place during observations.*

Measurement Criteria: *Observe equipment and process operations a number of times for consistency.*

Measurement Criteria: *Analyze equipment and process data regularly.*

Performance Element: **Maintain up-to-date knowledge of all documentation related to equipment.**

Measurement Criteria: *Make all relevant materials easily available.*

Measurement Criteria: *Use machine identifiers, equipment lists, and process data to locate relevant information.*

Measurement Criteria: *Use all relevant databases in a timely manner.*

Measurement Criteria: *Pull information relevant and specific to the requirements of the work to be performed from documents quickly.*

Measurement Criteria: *Use only information that is up-to-date.*

Measurement Criteria: *Discuss interpretations and questions on materials, specifications, and diagnostics.*

Performance Element: **Maintain information about equipment use and reliability.**

Measurement Criteria: *Accurately maintain data on equipment life.*

Measurement Criteria: *Keep document up-to-date.*

Measurement Criteria: *Accurately document tool change data.*

Measurement Criteria: *Make contact information on tool vendor is readily available.*

Measurement Criteria: *Gather information to identify the proper tool for maintenance and repair tasks.*

Performance Element: **Maintain all relevant equipment operation and repair certifications.**

Measurement Criteria: *Properly plan certifications and schedule them in advance.*

Measurement Criteria: *Make sure that only qualified personnel perform certifications.*

Measurement Criteria: *Document certifications properly and report them to the correct parties.*

Measurement Criteria: *Follow all applicable laws and regulations when performing*

Pathway Topic: Hands-On Knowledge

equipment inspections and documenting them.

Measurement Criteria: *Keep records current and accurate.*

Measurement Criteria: *Verify that level of detail of certification documentation is appropriate.*

Measurement Criteria: *Forward information related to tool and equipment obsolescence to certify the repair, rebuild, or replacement.*

Performance Element: **Maintain personal certification and licensure.**

Measurement Criteria: *Make sure that certifications are performed by the appropriate parties as required.*

Measurement Criteria: *Update certifications as appropriate.*

Measurement Criteria: *Communicate new requirements appropriately.*

Measurement Criteria: *Make documentation is available to appropriate personnel.*

Measurement Criteria: *Identify training requirements needed for certifications.*

Measurement Criteria: *Obtain all necessary training.*

Pathway Topic: Equipment Safety

Pathway KS Statement: **Ensure that equipment is being used safely in the workplace.**

Performance Element: **Train others to use equipment safely.**

Measurement Criteria: *Give new operators a complete orientation of equipment.*

Measurement Criteria: *Communicate clearly and effectively all important information regarding equipment safety.*

Measurement Criteria: *Help maintenance workers obtaining certification to train others in technical skills and knowledge.*

Measurement Criteria: *Suggest training materials and content to appropriate parties.*

Measurement Criteria: *Use evaluation and feedback to improve training materials and methods.*

Measurement Criteria: *Make sure trainees have the correct tools to do the job during training.*

Measurement Criteria: *Conduct post-training evaluation to assure that workers can operate equipment safely.*

Measurement Criteria: *Verify that training and facilitation techniques are appropriate for the audience.*

Measurement Criteria: *Assure that quality and effectiveness of training are documented appropriately.*

Performance Element: **Suggest processes and procedures to support safety and effectiveness in the work environment.**

Measurement Criteria: *Consult health and safety representatives for suggestions.*

Measurement Criteria: *Solicit operator feedback to evaluate training and create a safer, more effective work environment.*

Measurement Criteria: *Make sure suggestions for training improvement are documented and sent to the appropriate parties.*

Measurement Criteria: *Make suggestions that address safety, quality and productivity issues.*

Performance Element: **Examine all parameters of the workplace to fulfill safety and**

Pathway Topic: Equipment Safety

health requirements for maintenance, installation, and repair.

Measurement Criteria: *Make regular safety communications to all employees.*

Measurement Criteria: *Review job safety analyses regularly according to company policy.*

Measurement Criteria: *Explain the ramifications of failure to accurately follow hazardous materials procedures and policies such as Material Safety Data Sheet and "right to know".*

Measurement Criteria: *Confirm that environmental testing of workplace is performed on a regular basis as required by company policy or regulation.*

Measurement Criteria: *Confirm that equipment is audited to ensure there are no bypasses of safety guards.*

Measurement Criteria: *Verify that regulatory and company safety procedures are followed including lock-out & tag-out, confined space, and ergonomics.*

Measurement Criteria: *Evaluate good housekeeping procedures.*

Measurement Criteria: *Verify that safety and personal protective equipment is available, performs correctly, and has current certification.*

Performance Element: Monitor equipment and operator performance to assure workplace safety and compliance with both company and national regulations.

Measurement Criteria: *Verify that monitoring is being performed regularly.*

Measurement Criteria: *Report out-of-compliance or unsafe conditions immediately.*

Measurement Criteria: *Take corrective action when out-of-compliance or unsafe conditions exist.*

Measurement Criteria: *Check equipment to ensure it is operating according to specifications and that tools are checked for compliance with specifications.*

Measurement Criteria: *Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables.*

Measurement Criteria: *Gather information on equipment use from operators to reveal existing or potential problems.*

Measurement Criteria: *Adjust equipment and processes as required.*

Measurement Criteria: *Accurately document all monitored data.*

Pathway Topic: Equipment Problems

Pathway KS Statement: Identify, diagnose, and/or repair equipment problems.

Performance Element: Gather equipment information and history to identify and/or diagnose problems.

Measurement Criteria: *Consult operator and operator logs to determine the nature of the problem.*

Measurement Criteria: *Check reports on equipment, repair and diagnostics for previous problems.*

Measurement Criteria: *Check equipment to identify problems.*

Measurement Criteria: *Gather the most appropriate information need to rapidly diagnose the problem.*

Pathway Topic: Equipment Problems

Measurement Criteria: *Consult appropriate and accurate sources of information including prints, OEM manuals, process diagrams, and engineering department calibrations.*

Performance Element: **Follow procedures to isolate system and component failure.**

Measurement Criteria: *Draw on available information, past experience, operator feedback, and knowledge of equipment to identify possible causes of failure.*

Measurement Criteria: *Use visual inspection, observation of equipment during operations, and disassembly of equipment to systematically gather information about the nature and possible causes of failure.*

Measurement Criteria: *Perform and repeat diagnostic tests as necessary to determine the nature of the problem.*

Measurement Criteria: *Make diagnosis in a timely and effective manner.*

Measurement Criteria: *Use manufacturer's performance specifications when evaluating equipment performance.*

Measurement Criteria: *Initiate procedure for isolating problems correctly and complete follow through properly.*

Performance Element: **Identify root cause of problem.**

Measurement Criteria: *Use appropriate root cause identification process to determine contributing factors.*

Measurement Criteria: *Perform the correct tests and inspections on failed component(s).*

Measurement Criteria: *Analyzed data gathered through diagnostic procedures to develop a hypothesis regarding possible root causes.*

Measurement Criteria: *Repeat analysis until problem is solved.*

Performance Element: **Develop corrective action plan to fix the problem.**

Measurement Criteria: *Correctly specify all future repairs and modifications required to address underlying causes.*

Measurement Criteria: *Use the action plan to address the need for timely repair.*

Measurement Criteria: *Include proper repair procedures, proper tools and parts, and estimated time required for repair in the plan.*

Measurement Criteria: *Inform and involve the right people needed for the repair.*

Measurement Criteria: *Make sure that plan reflects production needs.*

Measurement Criteria: *Make sure that plan accounts for variables in schedule, staffing, and availability of parts.*

Performance Element: **Execute corrective action plan.**

Measurement Criteria: *Use applicable safety procedures.*

Measurement Criteria: *Wear proper personal protective equipment.*

Measurement Criteria: *Follow existing repair procedures in accordance with OEM manuals or company procedures.*

Measurement Criteria: *Use correct disassembly, repair/replacement, and reassembly procedures.*

Measurement Criteria: *Safety check equipment and perform a test run prior to return to production.*

Pathway Topic: Equipment Problems

Measurement Criteria: *Make sure that post-repair tests confirm that equipment performs to requirements.*

Measurement Criteria: *Complete repairs within specified time frames.*

Measurement Criteria: *Devote appropriate staffing and parts to effectively execute the plan.*

Performance Element: **Document diagnosis, case history plan, and repair outcome.**

Measurement Criteria: *Perform documentation and verification according to company and department policies and procedures.*

Measurement Criteria: *Input documents and appropriate files into database before filing them or distributing to correct parties.*

Measurement Criteria: *Conduct post repair review to determine if customer is satisfied.*

Measurement Criteria: *Adjust preventive maintenance schedule properly to reflect repairs made.*

Measurement Criteria: *Notify equipment manufacturer of any reliability and maintainability issues.*

Pathway Topic: Equipment

Pathway KS Statement: **Support the installation, customization, or upgrading of equipment.**

Performance Element: **Coordination preparation for the installation, customization, or upgrading of equipment.**

Measurement Criteria: *Provide appropriate input on equipment, environmental impact, and material needs.*

Measurement Criteria: *Include the time, equipment, and personnel required to do the job in the plan.*

Measurement Criteria: *Determine proper customization, upgrade needs, and capacity limits.*

Measurement Criteria: *Obtain all appropriate approvals.*

Measurement Criteria: *Make sure that plan provides for the availability and use of proper materials and relevant vendor information.*

Measurement Criteria: *Make sure that plan anticipates the need for future modifications and likelihood of mechanical or operator errors.*

Measurement Criteria: *Make sure that plan addresses issues related to ergonomics, safety requirements, and environmental impact.*

Performance Element: **Obtain information from vendors to ensure proper installation, customization, or upgrade.**

Measurement Criteria: *Determine availability of in-house personnel and outside contractors.*

Measurement Criteria: *Contact appropriate vendor personnel to determine facility, parts, equipment, and materials needs prior to installation.*

Measurement Criteria: *Verify materials and parts against vendor specifications prior to initiating installation, customization, or upgrading equipment.*

Measurement Criteria: *Obtain needed information from vendors including safety and quality considerations.*

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Pathway Topic: Equipment

Measurement Criteria: *Make accurate blueprints, specifications, and documentation are available.*

Measurement Criteria: *Review maintenance manuals, check them for completeness, and modify them as necessary.*

Performance Element: **Participate in the installation, customization, or upgrading of equipment.**

Measurement Criteria: *Follow all safety procedures.*

Measurement Criteria: *Organize tools, equipment, and personnel efficiently to do the job.*

Measurement Criteria: *Follow blueprint and plan of action to customize or upgrade equipment.*

Measurement Criteria: *Perform follow-up to ensure completeness of installation.*

Measurement Criteria: *Remove appropriate lock-out/tag-out devices are removed.*

Measurement Criteria: *Complete equipment installation, customization, or upgrade to specification and schedule.*

Performance Element: **Prepare team.**

Measurement Criteria: *Schedule the proper workers to ensure effectiveness, efficiency, and safety.*

Measurement Criteria: *Ensure that personnel are trained on the proper procedures and equipment maintenance.*

Measurement Criteria: *Involve vendors appropriately.*

Performance Element: **Move or remove equipment.**

Measurement Criteria: *Schedule the proper workers to ensure effectiveness, efficiency, and safety.*

Measurement Criteria: *Ensure that personnel are trained on the proper procedures and equipment maintenance.*

Measurement Criteria: *Involve vendors appropriately.*

Measurement Criteria: *Move or remove equipment completely, safely, and according to company and vendor procedures.*

Measurement Criteria: *Verify that equipment works properly following its move.*

Performance Element: **Test the equipment to ensure proper function after installation, customization or upgrading.**

Measurement Criteria: *Select proper testing procedures and methods.*

Measurement Criteria: *Administer test procedures and methods properly.*

Measurement Criteria: *Perform test safely.*

Measurement Criteria: *Interpret test results correctly.*

Measurement Criteria: *Notify all appropriate parties that equipment is functioning properly.*

Measurement Criteria: *Make sure that equipment tests indicate that equipment performs to specification and meets safety standards.*

Measurement Criteria: *Document test results.*

Pathway Topic: Preventive Maintenance

Pathway KS Statement: **Follow a preventative maintenance schedule to maintain equipment, tools and workstations.**

Pathway Topic: Preventive Maintenance

Performance Element: Contact proper people and assure supplies are available to perform preventive maintenance and routine repair.

Measurement Criteria: *Verify that preventive maintenance is performed to schedule and documented completely in a timely manner.*

Measurement Criteria: *Use the right procedures and forms to communicate repair needs to the correct parties.*

Measurement Criteria: *Follow-up to verify that necessary repair work was completed.*

Measurement Criteria: *Have necessary supplies available to perform preventive maintenance.*

Measurement Criteria: *Predict the results of failing to effectively communicate the all elements of the preventive maintenance schedule.*

Measurement Criteria: *Follow all safety regulations when doing repairs.*

Performance Element: Monitor equipment indicators to ensure it is operating correctly.

Measurement Criteria: *Compare equipment performance to optimal equipment operations on a regular schedule.*

Measurement Criteria: *Investigate and correct abnormal equipment conditions in a timely manner.*

Measurement Criteria: *Monitored equipment to ensure that the corrective action solved the problem.*

Measurement Criteria: *Keep equipment repair history complete, up-to-date, and accurate.*

Performance Element: Provide documented training to assure maintenance activities meet company regulations.

Measurement Criteria: *Conduct training in an effective and appropriate manner.*

Measurement Criteria: *Document and make available preventive maintenance training materials.*

Measurement Criteria: *Keep training records updated and readily available.*

Measurement Criteria: *Examine the relevancy of training for use of equipment, tools, materials, and processes at the workstation.*

Measurement Criteria: *Provide cross-training when appropriate.*

Measurement Criteria: *Verify that training and training documentation meet all company and regulatory requirements.*

Performance Element: Perform daily housekeeping to maintain production schedules and provide a safe working environment.

Measurement Criteria: *Store tools and materials safely in proper locations.*

Measurement Criteria: *Identify and report unsafe conditions promptly.*

Measurement Criteria: *Keep workstations clean and clear of safety hazards.*

Measurement Criteria: *Verify that scheduled housekeeping inspections are passed.*

Measurement Criteria: *Organize workstations to maximize efficiency.*

Measurement Criteria: *Verify that safety equipment is present and in proper working order.*

Pathway Topic: Production Process

Pathway KS Statement: Coordinate predictive and preventive maintenance to

Pathway Topic: Production Process

ensure that production process runs smoothly.

Performance Element: Develop the maintenance schedule.

Measurement Criteria: *Schedule routine jobs that need to be completed in a timely way.*

Measurement Criteria: *Make sure that schedule is sufficiently flexible to include plans for fall-back if tasks take longer and to add fill-in work if tasks are shorter than expected.*

Measurement Criteria: *Use company procedures for production needs, output, and critical equipment to schedule priorities.*

Measurement Criteria: *Verify that preventive maintenance requirements for all equipment are included in the schedule.*

Measurement Criteria: *Distribute scheduled task lists appropriately.*

Measurement Criteria: *Make sure that the schedule provides adequate time for preventive maintenance.*

Measurement Criteria: *Make parts required for maintenance available when needed.*

Performance Element: Identify special maintenance and repair needs.

Measurement Criteria: *Ask operators appropriate questions to determine needs.*

Measurement Criteria: *Review tool and equipment histories to find evidence of intermittent or chronic problems.*

Measurement Criteria: *Refer to job safety analysis sheets as appropriate.*

Measurement Criteria: *Observe operators to verify that they are setting up and operating according to the job safety analysis.*

Measurement Criteria: *Review repair histories to see if correct repairs were done in the past.*

Measurement Criteria: *Review repair histories to determine current repair needs.*

Measurement Criteria: *Identify worn or malfunctioning equipment accurately and in a timely way to prevent breakdowns.*

Performance Element: Check on availability of workers and other resources.

Measurement Criteria: *Locate special tools and parts.*

Measurement Criteria: *Access existing preventive maintenance protocols from the preventive maintenance sheets.*

Measurement Criteria: *Make decisions on staffing requirements based on the tasks that need to be performed.*

Measurement Criteria: *Make sure that retooled parts meet specifications.*

Measurement Criteria: *Make sure that follow-up occurs to ensure that adequate supplies are maintained.*

Performance Element: Perform predictive and preventive maintenance.

Measurement Criteria: *Follow procedures when handling and disposing hazardous materials.*

Measurement Criteria: *Follow safety procedures and wear/use proper personal protective equipment.*

Measurement Criteria: *Follow preventive maintenance sheets completely.*

Measurement Criteria: *Perform maintenance with proper workers to ensure that the job is performed safely and efficiently.*

Pathway Topic: Production Process

Measurement Criteria: *Gather required parts, tools, and equipment prior to starting the maintenance.*

Measurement Criteria: *Use required parts, tools, and equipment to perform work safely and efficiently.*

Measurement Criteria: *Use company or department procedure to document and verify maintenance job.*

Measurement Criteria: *Use policy and procedures to maintain documentation.*

Measurement Criteria: *Turn documentation to the correct parties for processing.*

Measurement Criteria: *Perform maintenance on time.*

Measurement Criteria: *Perform housekeeping when job is finished.*

Measurement Criteria: *Use repair histories to revise preventive maintenance plan.*

Performance Element: **Check that equipment is working prior to releasing the equipment to the operator.**

Measurement Criteria: *Complete safety checklist thoroughly.*

Measurement Criteria: *Document results of safety checklist.*

Measurement Criteria: *Test-run equipment to ensure that it is operating properly and safely.*

Measurement Criteria: *Take corrective measures if equipment is not operational.*

Measurement Criteria: *Communicate readiness of equipment to come back onto production to correct parties before departing the site.*

Measurement Criteria: *Use the preventive maintenance sheet to inspect and verify the appropriate items.*

PATHWAY: Quality Assurance

Pathway Topic: Communications

Pathway KS Statement: *Communicate with co-workers and/or external customers to ensure production meets business requirements.*

Performance Element: Use speaking and presentation skills to effectively communicate safety, training, and job-specific needs.

Measurement Criteria: *Ensure that safety issues are understood and safety practices are being used.*

Measurement Criteria: *Explain the significance of on-the-job issues and concerns being discussed and quickly resolved.*

Measurement Criteria: *Identify current and future training issues in a timely way.*

Measurement Criteria: *Verify that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Be clear and relevant with communications related to safety, training, and job-specific needs.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back safety, training, and job-specific issues to original communicator.*

Measurement Criteria: *Track and document communications related to safety, training, and job-specific needs.*

Performance Element: Be timely and accurate in communicating material specifications and delivery schedules.

Measurement Criteria: *Make sure that communication reflects knowledge of material specifications.*

Measurement Criteria: *Communicate delivery schedules clearly.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication is clear and relevant to material and delivery issues.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back material and delivery issues to original communicator.*

Measurement Criteria: *Track and document material specifications and delivery schedules.*

Performance Element: Communicate production requirements and product specifications.

Measurement Criteria: *Make sure that communication reflects knowledge of production requirements, levels, and product specifications.*

Measurement Criteria: *Initiate communication to meet production requirements, product specifications, or other customer or business needs cross-functionally as required.*

Measurement Criteria: *Notify all parties of production issues and problems in a timely way.*

Measurement Criteria: *Make sure that communication shows knowledge of both*

Pathway Topic: Communications

customer and business needs.

Measurement Criteria: *Make sure that communication to production and products is clear and relevant.*

Measurement Criteria: *Evaluate, track, and report production and product issues back to original communicator.*

Measurement Criteria: *Track and document communications related to production requirements and product specifications as appropriate.*

Pathway Topic: Monitoring

Pathway KS Statement: **Monitor production operations for product and process quality.**

Performance Element: **Track materials for quality throughout production process.**

Measurement Criteria: *Prepare detailed quality instructions for each operation.*

Measurement Criteria: *Record accurate information about material quality at each operation.*

Measurement Criteria: *Communicate quality information to all appropriate parties.*

Measurement Criteria: *Maintain accurate records of material movement necessary to ensure quality and traceability.*

Performance Element: **Check product sample for quality at each state of production.**

Measurement Criteria: *Monitor sample results to ensure they comply with specifications.*

Measurement Criteria: *Report samples that do not conform to specification promptly.*

Measurement Criteria: *Keep records of quality results as required by procedures or work instructions.*

Measurement Criteria: *Label and document samples that do not conform to standards.*

Measurement Criteria: *Indicate the samples that have been checked at each state.*

Performance Element: **Check that final product meets quality specifications.**

Measurement Criteria: *Make accurate records of inspections and tests readily available.*

Measurement Criteria: *Communicate approval and rejection results on a timely basis to appropriate parties.*

Measurement Criteria: *Make sure that all product specifications have been followed.*

Measurement Criteria: *Perform product audits according to defined plan.*

Measurement Criteria: *Review follow-up data to ensure customer satisfaction with finished product.*

Measurement Criteria: *Obtain final documentation from all departments to effectively check product against specifications.*

Performance Element: **Document quality results at each state of production process.**

Measurement Criteria: *Fill out proper records correctly for each state of production.*

Measurement Criteria: *Verify that approval and rejections are in place as required on appropriate documentation.*

Measurement Criteria: *Verify that quality data meets specifications.*

Measurement Criteria: *Communicate final quality results to appropriate parties.*

Measurement Criteria: *Make sure that documentation is clear and complete.*

Pathway Topic: Correcting

Pathway KS Statement: **Correct the product and process to meet quality standards.**

Performance Element: **Communicate quality problems.**

Measurement Criteria: *Review quality problems with production operators.*

Measurement Criteria: *Communicate quality problems promptly to appropriate parties.*

Measurement Criteria: *Use established processes to document quality problems.*

Measurement Criteria: *Summarize and report defect trends to appropriate parties.*

Performance Element: **Suggest or perform corrective actions to correct quality problems.**

Measurement Criteria: *Make minor quality issues or adjustments immediately.*

Measurement Criteria: *Document quality issues or adjustment properly.*

Measurement Criteria: *Write recommendations for action that are clear, concise, and supported by data.*

Measurement Criteria: *Submit recommendations to the appropriate parties in a timely way.*

Measurement Criteria: *Use follow-up activities indicated to verify that corrective action was taken.*

Measurement Criteria: *Document product quality following corrective action.*

Performance Element: **Determine appropriate action for sub-standard product.**

Measurement Criteria: *Execute quality procedures regarding sub-standard products within the defined quality systems promptly.*

Measurement Criteria: *Document decisions regarding sub-standard products for future retrieval.*

Measurement Criteria: *Process sub-standard product appropriately.*

Measurement Criteria: *Distribute documentation required for customers to appropriate parties.*

Performance Element: **Record process outcomes and trends.**

Measurement Criteria: *Maintain records on quality process to appropriate standards.*

Measurement Criteria: *Use appropriate methods and standards to chart outcomes of quality processes.*

Measurement Criteria: *Verify accuracy of data on quality process performance.*

Measurement Criteria: *Analyze quality process performance data to identify trends.*

Measurement Criteria: *Report quality process performance data to appropriate parties in a timely manner.*

Performance Element: **Identify and report performance and training issues affecting quality.**

Measurement Criteria: *Identify performance and training issues related to quality in a timely manner.*

Measurement Criteria: *Take corrective action for quality issues impacting the health or safety of workers.*

Performance Element: **Implement closed-loop corrective action.**

Measurement Criteria: *Document evidence of corrected action in a timely manner.*

Pathway Topic: Correcting

Measurement Criteria: *Use the correct format to communicate change resulting from the corrective action to appropriate parties.*

Measurement Criteria: *Use spot checks to verify the implementation of the corrective action.*

Measurement Criteria: *Store reports properly for the specified timeframes.*

Measurement Criteria: *Perform ongoing audits to optimize the outcomes of the corrective steps.*

Measurement Criteria: *Examine previous documentation on similar process issues to identify possible solutions.*

Pathway Topic: Suggestions

Pathway KS Statement: **Suggest and/or implement continuous improvement actions.**

Performance Element: **Analyze data to identify potential.**

Measurement Criteria: *Apply quality tools properly to determine the source of potential quality problems.*

Measurement Criteria: *Reassess process capability continuously.*

Measurement Criteria: *Validate process and product measurement systems.*

Measurement Criteria: *Adjust process and product measurement systems as required.*

Measurement Criteria: *Report quality data to appropriate parties in a timely manner.*

Performance Element: **Monitor process capability.**

Measurement Criteria: *Verify that processes meet manufacturer and other quality specifications.*

Measurement Criteria: *Verify that process meet company or customer capability requirements.*

Measurement Criteria: *Verify that process meets on-time delivery needs of the customer.*

Measurement Criteria: *Use approved procedures to report analyzed process capability data.*

Measurement Criteria: *Use results of capability studies to adjust product or process.*

Measurement Criteria: *Report results of capability studies to appropriate parties.*

Performance Element: **Monitor customer satisfaction.**

Measurement Criteria: *Use appropriate data to measure customer satisfaction.*

Measurement Criteria: *Implement surveys and other customer data techniques in a timely manner.*

Measurement Criteria: *Report returned goods to appropriate parties for review.*

Measurement Criteria: *Include appropriate vendor certifications with customer documentation.*

Measurement Criteria: *Document on-time delivery data appropriately.*

Measurement Criteria: *Review field failures and product life data in a timely manner.*

Performance Element: **Measure and record product and process outcomes.**

Measurement Criteria: *Use the proper format to record product and process outcomes within the approved timeframe.*

Measurement Criteria: *Use appropriate quality analysis and statistical technique to*

Pathway Topic: Suggestions

analyze performance.

Measurement Criteria: *Report outcomes to all appropriate parties.*

Performance Element: **Participate in making new work procedures.**

Measurement Criteria: *Translate recommendations for continuous improvement into new work instructions.*

Measurement Criteria: *Use the appropriate format to publish work instructions.*

Measurement Criteria: *Use the standard procedures to distribute work instructions.*

Measurement Criteria: *Discuss new work procedures or instructions with all stakeholders to ensure support for improvements.*

Performance Element: **Implement approved recommendations.**

Measurement Criteria: *Make sure that recommendations for continuous improvement are clear, concise, and based on data trends and patterns.*

Measurement Criteria: *Make recommendations in a way that draws support for process improvement.*

Measurement Criteria: *Provide information to ensure that all stakeholders understand their role in process improvement changes.*

Measurement Criteria: *Use documented accepted process improvements to translate into revised work processes and procedures.*

Performance Element: **Check that final product meets customer and business needs.**

Measurement Criteria: *Verify that final test results meet customer requirements.*

Measurement Criteria: *Determine if product was produced within company time and cost parameters.*

Measurement Criteria: *Take action to minimize negative customer feedback on quality issues.*

Pathway Topic: Work Teams

Pathway KS Statement: **Coordinate work teams to produce product.**

Performance Element: **Provide training to other employees.**

Measurement Criteria: *Provide cross training as appropriate.*

Measurement Criteria: *Assess training needs on a regular basis.*

Measurement Criteria: *Identify new requirements and training issues.*

Measurement Criteria: *Use varied approaches to achieve training goals.*

Measurement Criteria: *Document training outcomes.*

Performance Element: **Set team goals to enhance performance.**

Measurement Criteria: *Make goals specific, measurable, and achievable.*

Measurement Criteria: *Align team goals to customer and business needs.*

Measurement Criteria: *Focus team goals to meet team objectives.*

Measurement Criteria: *Document team goals and share information with all parties.*

Performance Element: **Make job assignments to avail the use of the best personnel in key assignments.**

Measurement Criteria: *Make job assignments to match the skills needed for the work to be done and to maximize the use of available skills.*

Measurement Criteria: *Make job assignments to ensure that business and customer needs are met.*

Pathway Topic: Work Teams

Measurement Criteria: *Confirm that workers are notified of assignments effectively.*

Performance Element: **Coordinate workflow with team members and other work groups.**

Measurement Criteria: *Make sure that production schedules are met effectively.*

Measurement Criteria: *Notify team members of schedule requirements in a timely way.*

Measurement Criteria: *Make sure that production workflow runs efficiently.*

Measurement Criteria: *Take necessary action to minimize downtime.*

Measurement Criteria: *Explain the significance of relationships with others in facilitating workflow.*

Measurement Criteria: *Verify that workers actively participate in meetings and problem-solving groups.*

Pathway Topic: Quality Assurance

Pathway KS Statement: **Produce a product to satisfy customer desires.**

Performance Element: **Conduct in-depth investigation to identify customer needs.**

Measurement Criteria: *Meet those needs that differ between internal and external customers as well as those that both share.*

Measurement Criteria: *Maintain contact with customer about the product aspects and its specifications to ensure thorough understanding of needs.*

Measurement Criteria: *Review, maintain, and communicate customer needs and specifications.*

Measurement Criteria: *Address issues preventing customer needs from being met proactively.*

Performance Element: **Verify that needed resources are available for the production process.**

Measurement Criteria: *Use work orders when handling raw materials, while setting up of tools and equipment, and when scheduling workers to maximize productivity.*

Measurement Criteria: *Report any discrepancies related to raw materials, tools/equipment, and workers abilities/availability properly.*

Measurement Criteria: *Identify consequences of not reporting discrepancies in production.*

Performance Element: **Set up equipment for the production process.**

Measurement Criteria: *Make proper repairs and adjustments to equipment prior to putting into service.*

Measurement Criteria: *Verify that set-up meets process specifications of both internal and external customers.*

Measurement Criteria: *Verify that the first piece or production meets both product specifications and production capacities.*

Measurement Criteria: *Document set-up procedures to ensure repeatability.*

Measurement Criteria: *Identify possible consequences resulting from failure to meet ergonomic and other relevant health, safety, and environmental standards.*

Performance Element: **Use process control data to monitor fabrication of the product.**

Measurement Criteria: *Use process control data to indicate that the manufacturing*

Pathway Topic: Quality Assurance

process complies with standards.

Measurement Criteria: *Make the manufacturing process cycle time meet customer and business needs.*

Measurement Criteria: *Identify possible consequences resulting from failure to perform operations safely.*

Measurement Criteria: *Verify that the product meets customer specifications.*

Measurement Criteria: *Complete, maintain, and forward product and process documentation to proper parties.*

Measurement Criteria: *Verify that production operations comply with all health, safety, and environmental policies and procedures.*

Performance Element: **Inspect the product to verify that it meets specifications.**

Measurement Criteria: *Verify the calibration of the testing equipment.*

Measurement Criteria: *Follow the established sampling plan and inspection policies/procedures.*

Measurement Criteria: *Identify product and production process that do not meet specifications promptly.*

Measurement Criteria: *Complete inspection documents accurately and forward them to proper parties.*

Measurement Criteria: *Follow appropriate testing/production tools and procedures.*

Measurement Criteria: *Identify and communicate adjustments needed to bring the production process back into specification.*

Measurement Criteria: *Make necessary adjustment in the manufacturing process in a timely manner.*

Performance Element: **Document product and process to assure formal compliance with customer requirements.**

Measurement Criteria: *Write compliance documents legibly in the appropriate format and store them in a safe, secure place.*

Measurement Criteria: *Complete compliance documentation, obtain "sign off," and forward to the proper parties.*

Measurement Criteria: *Label products for compliance and non-compliance appropriately.*

Performance Element: **Check for specified quantities and proper documentation to prepare a final product for shipping or distribution.**

Measurement Criteria: *Package materials to meet packaging and shipping specifications (including proper labeling).*

Measurement Criteria: *Complete package documentation and customer shipping instructions to accompany the product to the next destination.*

Measurement Criteria: *Communicate product availability to the proper parties in a timely manner.*

Measurement Criteria: *Check relevant information such as quantity, destination and packaging instructions against the work order.*

Measurement Criteria: *Verify that product is correctly stored or staged for shipping.*

Measurement Criteria: *Explain the significance of following all laws and regulations related to labeling, packaging, and transport.*

Measurement Criteria: *Verify that material handling procedures are followed to*

Manufacturing

Pathway Topic: Quality Assurance

prevent product damage.

Pathway Topic: Safety

Pathway KS Statement: Maintain a safe and productive workplace.

Performance Element: Follow local, federal and company regulations to perform environmental and safety inspections.

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: Participate in emergency response teams to perform emergency drills.

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: Identify unsafe conditions and take corrective action.

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: Provide safety orientation to train other employees in safe practices and emergency procedures.

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.*

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Quality Improvement

Pathway KS Statement: Maintain quality and implement continuous improvement processes.

Pathway Topic: Quality Improvement

Performance Element: Perform periodic internal quality audit activities.

Measurement Criteria: *Complete all audit forms correctly in a timely manner.*

Measurement Criteria: *Forward forms to the correct parties.*

Measurement Criteria: *Verify that audit data is relevant and correct.*

Measurement Criteria: *Make sure that conformances to quality standards are properly assessed and documented.*

Measurement Criteria: *Include observation of operation in audit when appropriate to ensure performance meets specifications.*

Measurement Criteria: *Follow company and other required schedules and procedures to perform audit.*

Performance Element: Check calibration of gauges and other data collection equipment.

Measurement Criteria: *Follow specifications to implement calibration schedule.*

Measurement Criteria: *Review documents and use thorough careful observation to check instrument certification during use.*

Measurement Criteria: *Recalibrate instruments that are out of calibration or refer them to the appropriate parties for recalibration or repairs immediately.*

Performance Element: Suggest continuous improvements.

Measurement Criteria: *Use observations and data analysis to generate potential improvements.*

Measurement Criteria: *Verify that suggestions communicate measurable and data-driven benefits to the company, its customers, and employees.*

Measurement Criteria: *Use proper procedures and documentation to make suggestions.*

Measurement Criteria: *Make sure that all suggestions show that all data was reviewed prior to making recommendation.*

Performance Element: Inspect materials at all stages of process to determine quality or condition.

Measurement Criteria: *Follow schedule and procedures to complete sampling and inspection.*

Measurement Criteria: *Select and use inspection tools and procedures correctly.*

Measurement Criteria: *Inspect materials against correct specifications.*

Measurement Criteria: *Identify materials that do not meet specification correctly.*

Measurement Criteria: *Take corrective action on out-of-specification material.*

Measurement Criteria: *Document inspection results properly.*

Measurement Criteria: *Report inspection results to correct parties.*

Performance Element: Document the results of quality tests.

Measurement Criteria: *Check data forms to ensure that they are complete and accurate.*

Measurement Criteria: *Make sure that information is evaluated and interpreted correctly.*

Measurement Criteria: *Forward data to correct parties.*

Measurement Criteria: *Select and use correct analytical tools properly.*

Pathway Topic: Quality Improvement

Performance Element: Make adjustments to restore or maintain quality.

Measurement Criteria: Make sure that appropriate corrective actions are identified and approvals received when needed.

Measurement Criteria: Make adjustments to eliminate deviations and bring the process back into control.

Measurement Criteria: Make adjustments in a timely manner.

Measurement Criteria: Document adjustments properly.

Pathway Topic: Specifications

Pathway KS Statement: Ensure materials meet quality specifications.

Performance Element: Inspect materials against quality specifications.

Measurement Criteria: Identify materials required for productions correctly.

Measurement Criteria: Reject non-conforming material.

Measurement Criteria: Document inspection results.

Measurement Criteria: Make sure that documentation records clearly indicate inspection and verification results.

Performance Element: Report material quality deviations to production.

Measurement Criteria: Report quality deviations to the correct parties in a timely fashion.

Measurement Criteria: Describe quality deviations accurately.

Measurement Criteria: Use the prescribed format to report quality deviations.

Performance Element: Release materials that meet specifications to production.

Measurement Criteria: Use production plan implement release procedure.

Measurement Criteria: Identify and label materials properly.

Measurement Criteria: Verify that all approvals are obtained before releasing materials.

Measurement Criteria: Document release approvals properly.

Measurement Criteria: Store materials not ready for release properly or redirect them for other use.

Performance Element: Maintain supplier relationships to ensure quality of materials.

Measurement Criteria: Maintain positive business relationships with suppliers.

Measurement Criteria: Maintain proper level of security and confidentiality in relationships with suppliers.

Measurement Criteria: Make delivery of materials just in time to meet production needs.

Measurement Criteria: Report information regarding cost and price to relevant parties.

Measurement Criteria: Provide suppliers with detailed material specifications, procedures, and processes to correct deviations.

PATHWAY: Logistics & Inventory Control

Pathway Topic: Communicating Business Requirements

Pathway KS Statement: *Communicate with co-workers and/or external customers to ensure production meets business requirements.*

Performance Element: Use speaking and presentation skills to effectively communicate safety, training, and job-specific needs.

Measurement Criteria: *Use communication sufficient to ensure that safety issues are understood and safety practices being used.*

Measurement Criteria: *Discuss and resolve on-the-job issues and concerns quickly.*

Measurement Criteria: *Identify current and future training issues in a timely way.*

Measurement Criteria: *Verify that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Be clear and relevant with communications related to safety, training, and job-specific needs.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back safety, training, and job-specific issues to original communicator.*

Measurement Criteria: *Track and document communications related to safety, training, and job-specific needs.*

Performance Element: Be timely and accurate in communicating material specifications and delivery schedules.

Measurement Criteria: *Make sure that communication reflects knowledge of material specifications.*

Measurement Criteria: *Communicate delivery schedules clearly.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Measurement Criteria: *Make sure that communication is clear and relevant to material and delivery issues.*

Measurement Criteria: *Communicate in a timely and accurate manner to the correct parties.*

Measurement Criteria: *Evaluate, track, and report back material and delivery issues to original communicator.*

Measurement Criteria: *Track and document material specifications and delivery schedules.*

Performance Element: Communicate production requirements and product specifications.

Measurement Criteria: *Make sure that communication reflects knowledge of production requirements, levels, and product specifications.*

Measurement Criteria: *Initiate communication cross-functionally as required to meet production requirements, product specifications, or other customer or business needs.*

Measurement Criteria: *Notify all parties of production issues and problems in a timely way.*

Measurement Criteria: *Make sure that communication shows knowledge of both customer and business needs.*

Pathway Topic: Communicating Business Requirements

Measurement Criteria: *Make sure that communication to production and products is clear and relevant.*

Measurement Criteria: *Evaluate, track, and report production and product issues back to original communicator.*

Measurement Criteria: *Track and document communications related to production requirements and product specifications as appropriate.*

Pathway Topic: Shipping and Receiving

Pathway KS Statement: Ship and receive products and materials.

Performance Element: Check accuracy of order.

Measurement Criteria: *Document product count accurately.*

Measurement Criteria: *Verify that product matches the purchase order and description.*

Measurement Criteria: *Verify that documentation is accurate as to count and product.*

Measurement Criteria: *Review order to ensure that contract terms and conditions are met.*

Measurement Criteria: *Use company procedures to report information to correct parties.*

Measurement Criteria: *Verify that health, safety, environmental, and government regulations are met.*

Performance Element: Package and unpackage materials and products.

Measurement Criteria: *Check container to verify that packing meets regulatory requirements.*

Measurement Criteria: *Check container to verify that packing has proper labeling and meets shipping and safety regulations.*

Measurement Criteria: *Store or dispose of packaging materials properly.*

Measurement Criteria: *Verify that contents of packages match receiving tickets.*

Measurement Criteria: *Verify that bill of lading matches items shipped.*

Measurement Criteria: *Use packaging and unpacking methods that keep returns and claims for damaged and improperly packaged goods to a minimum.*

Measurement Criteria: *Verify that outgoing labels have all relevant information.*

Measurement Criteria: *Check incoming labels to ensure that they meet all requirements.*

Performance Element: Load and unload materials and products.

Measurement Criteria: *Use proper equipment and techniques safely.*

Measurement Criteria: *Store materials correctly in a proper location.*

Measurement Criteria: *Verify that correct carrier and method is used for shipment.*

Measurement Criteria: *Verify that product arrives at appropriate destination.*

Measurement Criteria: *Load or unload product safely and according to government regulations.*

Measurement Criteria: *Check containers to ensure that damage to or contamination of materials is minimal.*

Performance Element: Schedule transportation of products and materials to meet customer needs.

Pathway Topic: Shipping and Receiving

Measurement Criteria: *Verify that appropriate carrier or method is used to ship product.*

Measurement Criteria: *Make sure that product is shipped on time.*

Measurement Criteria: *Verify that health, safety, environmental, and government regulations are met.*

Measurement Criteria: *Verify that no customer complaints are received about late partial shipments or damaged goods.*

Measurement Criteria: *Select the most cost-effective method to ship products.*

Pathway Topic: Safety

Pathway KS Statement: Maintain a safe and productive workplace.

Performance Element: Follow local, federal and company regulations to perform environmental and safety inspections.

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: Participate in emergency response teams to perform emergency drills.

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: Identify unsafe conditions and take corrective action.

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: Provide safety orientation to train other employees in safe practices and emergency procedures.

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training.*

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Pathway Topic: Safety

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Inventory

Pathway KS Statement: Manage inventory to meet production requirements.

Performance Element: Use a plan to monitor location of materials during production process.

Measurement Criteria: *Verify that materials are accessible to workstations.*

Measurement Criteria: *Check that that cycle counts for raw and finished goods meet established standards.*

Measurement Criteria: *Rotate raw materials and stock to minimize old and outdated inventory.*

Measurement Criteria: *Verify that materials move across the floor in an efficient and cost-effective way.*

Measurement Criteria: *Implement monitoring activities to prevent disruption of production flow.*

Measurement Criteria: *Distribute plan to correct parties in a timely way.*

Performance Element: Monitor placement of station materials to ensure production flow.

Measurement Criteria: *Check that materials and quantities needed for production are correctly placed.*

Measurement Criteria: *Verify that orders from production are being filled in a timely way.*

Measurement Criteria: *Make raw materials accessible to workstations.*

Measurement Criteria: *Rotate raw material stock to minimize old and outdated inventory.*

Measurement Criteria: *Prevent materials damage to a minimum by avoiding improper stationing or transport.*

Measurement Criteria: *Identify defective materials.*

Measurement Criteria: *Take appropriate action when defective materials are identified.*

Performance Element: Prepare documents that detail materials movement and inventory count.

Measurement Criteria: *Verify that production orders are accurate.*

Measurement Criteria: *Use the correct format to generate accurate reports for material movement and inventory count.*

Measurement Criteria: *Produce reports in a timely fashion and distribute them properly.*

Measurement Criteria: *Take accurate inventory.*

Performance Element: Establish lot sizes and reorder points to meet production requirements.

Measurement Criteria: *Check that production efficiencies are maintained.*

Measurement Criteria: *Keep obsolete finished products to minimum.*

Pathway Topic: Inventory

Measurement Criteria: *Use re-order points to minimize back-orders.*

Measurement Criteria: *Check that proper storage levels are maintained.*

Measurement Criteria: *Keep order lead-time requirements reasonable.*

Measurement Criteria: *Maintain inventory levels to minimize inventory value.*

Measurement Criteria: *Maintain inventory of raw material and finished goods to meet customer demands.*

Performance Element: **Conduct the on-site inventory to ensure productivity, safety, accuracy, and teamwork.**

Measurement Criteria: *Take inventory to ensure minimum interference to production within required timeframe.*

Measurement Criteria: *Make sure that inventory corrections are accurate and kept to a minimal.*

Measurement Criteria: *Carry out inventory activities safely.*

Measurement Criteria: *Keep inventory movement to a minimum during inventory count.*

Measurement Criteria: *Maintain the proper level of cooperation while conducting inventory.*

Measurement Criteria: *Use correct unit of measure to record inventory results.*

Measurement Criteria: *Follow asset protection and business control procedures.*

Performance Element: **Report discrepancies in inventory audit.**

Measurement Criteria: *Use a proper formant to present inventory audit.*

Measurement Criteria: *Distribute audit reports in a timely way to the proper parties.*

Measurement Criteria: *Communicate all inaccuracies to proper parties.*

Performance Element: **Find causes of discrepancies in inventory audit.**

Measurement Criteria: *Make sure that investigations into inventory inaccuracies are complete, timely, and include indication of root cause.*

Measurement Criteria: *Maintain collaborative and supportive interactions between material handlers and inventory control.*

Measurement Criteria: *Follow company policy in the event of inventory shortage.*

Measurement Criteria: *Report inaccuracies to the proper parties.*

Performance Element: **Change logistics processes and update inventory to respond to engineering changes.**

Measurement Criteria: *Follow company procedures when making change notices.*

Measurement Criteria: *Provide documentation of change notices and their implementation.*

Measurement Criteria: *Communicate change notices clearly to proper parties.*

Measurement Criteria: *Complete follow-up on paperwork properly.*

Measurement Criteria: *Make sure that documentation approving the logistics change is in hand prior to implementation.*

Measurement Criteria: *Review storage and retrieval systems to determine if upgrades and replacement are warranted.*

PATHWAY: Health, Safety and Environmental Assurance

Pathway Topic: Equipment Safety

Pathway KS Statement: *Ensure that equipment is being used safely in the workplace.*

Performance Element: **Train others to use equipment safely.**

Measurement Criteria: *Give new operators a complete orientation of equipment.*

Measurement Criteria: *Make sure that all important information regarding equipment safety is communicated clearly and effectively.*

Measurement Criteria: *Make sure that maintenance workers obtain certification to train others in technical skills and knowledge where applicable.*

Measurement Criteria: *Make suggestions regarding training materials and content to appropriate parties.*

Measurement Criteria: *Use evaluations and feedback to improve training materials and methods.*

Measurement Criteria: *Make sure trainees have the correct tools to do the job during training*

Measurement Criteria: *Conduct post-training evaluation to assure that workers can operate equipment safely.*

Measurement Criteria: *Use training and facilitation techniques appropriate for the audience.*

Measurement Criteria: *Document the quality and effectiveness of training appropriately.*

Performance Element: **Suggest processes and procedures to support safety and effectiveness in the work environment.**

Measurement Criteria: *Consult health and safety representatives to develop suggestions.*

Measurement Criteria: *Solicit operator feedback for use in creating a safer, more effective work environment.*

Measurement Criteria: *Make sure suggestions for training improvement are documented and sent to the appropriate parties.*

Measurement Criteria: *Make sure that content of suggestions addresses safety, quality, and productivity issues.*

Performance Element: **Fulfill safety and health requirements for maintenance, installation, and repair.**

Measurement Criteria: *Make regular safety communications to all employees.*

Measurement Criteria: *Review job safety analyses regularly according to company policy.*

Measurement Criteria: *Follow hazardous materials procedures and policies such as Material Safety Data Sheet and "right to know" accurately.*

Measurement Criteria: *Perform environmental testing of workplace on a regular basis as required by company policy or regulation.*

Measurement Criteria: *Audit equipment to ensure there are no by-passes of safety guards.*

Measurement Criteria: *Verify that regulatory and company safety procedures are followed including lock-out & tag-out, confined space, and*

Pathway Topic: Equipment Safety

ergonomics.

Measurement Criteria: *Follow good housekeeping procedures.*

Measurement Criteria: *Verify that safety and personal protective equipment is available, performs correctly, and has current certification.*

Performance Element: **Monitor equipment and operator performance to assure workplace safety and compliance with both company and national regulations.**

Measurement Criteria: *Perform monitoring responsibilities regularly.*

Measurement Criteria: *Report out-of-compliance or unsafe conditions immediately.*

Measurement Criteria: *Take corrective action on out-of-compliance or unsafe conditions.*

Measurement Criteria: *Check equipment to ensure it is operating according to specifications.*

Measurement Criteria: *Check tools for compliance with specifications.*

Measurement Criteria: *Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables.*

Measurement Criteria: *Gather information on equipment use from operators to reveal existing or potential problems.*

Measurement Criteria: *Adjust equipment and processes as required.*

Measurement Criteria: *Document all monitoring data accurately.*

Pathway Topic: Planning

Pathway KS Statement: **Plan for safety in new production processes.**

Performance Element: **Report hazards and problems.**

Measurement Criteria: *Identify hazards and problems correctly.*

Measurement Criteria: *Document hazards and problems properly.*

Measurement Criteria: *Follow policy and procedure to report hazards and problems.*

Measurement Criteria: *Communicate problems, hazards, and alerts promptly to appropriate parties.*

Measurement Criteria: *Make sure that incident and accident reports are complete, accurate, and available to relevant parties.*

Performance Element: **Ensure adherence to policies and procedures.**

Measurement Criteria: *Train employees properly in all safety procedures.*

Measurement Criteria: *Enforce company policies and procedures consistently according to the company policies and procedures.*

Measurement Criteria: *Make sure that safety policies are clear.*

Measurement Criteria: *Post safety policies properly.*

Measurement Criteria: *File safety violation reports and forms in a timely way.*

Measurement Criteria: *Conduct follow-up on safety violation reports and forms.*

Measurement Criteria: *Make sure that documentation of enforcement action is complete, clear, and conforming to regulatory requirements.*

Performance Element: **Take corrective action regarding safety policies and procedures.**

Measurement Criteria: *Make sure that corrective actions regarding safety are correct and complete.*

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Pathway Topic: Planning

Measurement Criteria: *Make sure that when correction actions are necessary that they are communicated clearly and appropriately to others.*

Measurement Criteria: *Take corrective actions immediate after discovery of safety hazard or problem.*

Measurement Criteria: *Make sure that follow-up occurs after corrective action takes place to ensure safe behavior is being exhibited.*

Performance Element: Document hazards and problems.

Measurement Criteria: *Make sure that documentation meets all regulations.*

Measurement Criteria: *Make sure that documentation is clear, accurate, and legible.*

Measurement Criteria: *Make sure that documentation is filed and accessible by relevant parties.*

Measurement Criteria: *Make sure that documentation is completed and updated in a timely way.*

Performance Element: Implement safety programs.

Measurement Criteria: *Make sure that new equipment conforms to safe manufacturing practices.*

Measurement Criteria: *Use Lock out/Tag out procedures properly.*

Measurement Criteria: *Evaluate product handling for physical safety concerns.*

Measurement Criteria: *Include safety features in product design.*

Pathway Topic: Investigations

Pathway KS Statement: Conduct health, safety, and/or environmental incident and hazard investigations.

Performance Element: Investigate health safety, and/or environmental incidents.

Measurement Criteria: *Follow the procedures established for investigations.*

Measurement Criteria: *Use root cause analysis to identify factors contributing to the incident.*

Measurement Criteria: *Use a standard procedure to interview all relevant parties in an impartial and tactful manner.*

Measurement Criteria: *Report investigation findings in a timely manner.*

Measurement Criteria: *Include relevant experts as needed in the incident investigation.*

Performance Element: Investigate health, safety, and/or environmental hazards.

Measurement Criteria: *Identify potential safety hazards promptly.*

Measurement Criteria: *Use established procedures to correct the hazard and report to correct parties for immediate attention.*

Measurement Criteria: *Complete documentation where appropriate and forward to correct parties.*

Performance Element: Document findings of health, safety, and/or environmental investigations.

Measurement Criteria: *Complete documentation accurately and submit to correct parties in a timely manner.*

Measurement Criteria: *Use appropriate procedures to include conclusions and recommended corrective action.*

Measurement Criteria: *Verify that documentation meets all applicable laws and*

Pathway Topic: Investigations

regulations.

Measurement Criteria: *Verify that documentation includes all necessary signatures.*

Performance Element: **Suggest corrective actions.**

Measurement Criteria: *Make recommendations based on solid data and root cause analysis.*

Measurement Criteria: *Document suggested actions appropriately and communicate them to the appropriate parties in a timely manner.*

Measurement Criteria: *Use the findings of the investigation to prepare suggested actions.*

Performance Element: **Check that appropriate action has been taken to correct health safety, and/or environmental problems.**

Measurement Criteria: *Update safe operating procedures in a timely manner.*

Measurement Criteria: *Complete safety work orders in a timely manner.*

Measurement Criteria: *Develop and deliver worker training if required.*

Measurement Criteria: *Analyze incident rates to determine if corrective action was effective.*

Measurement Criteria: *Complete follow-up investigation to ensure that corrective action is taken and root cause is addressed.*

Pathway Topic: Inspections

Pathway KS Statement: **Conduct preventive health, safety, and/or environmental incident and hazard inspections.**

Performance Element: **Check health safety, and/or environmental inspections.**

Measurement Criteria: *Make sure that audit records and documentation are complete and available.*

Measurement Criteria: *Make sure that audit records and documentation are complete and available.*

Measurement Criteria: *Use procedures established to conduct audits.*

Measurement Criteria: *Complete documentation related to audit accurately.*

Measurement Criteria: *Use appropriate forums and format to report audit documentation.*

Measurement Criteria: *Arrange for relevant experts in situations needing additional credibility on an as needed basis.*

Measurement Criteria: *Verify that audit was effective at identifying compliance and non-compliance issues.*

Performance Element: **Document inspection findings.**

Measurement Criteria: *Complete inspection reports accurately.*

Measurement Criteria: *Verify that corrective action reports or logs exist.*

Measurement Criteria: *Submit documentation to correct parties according to schedule.*

Measurement Criteria: *Verify that documentation includes all relevant information.*

Performance Element: **Conduct area health safety, and/or environmental inspections.**

Measurement Criteria: *Make sure that area inspection documentation is complete and available.*

Measurement Criteria: *Use procedures established to conduct area inspections.*

Manufacturing

Pathway Topic: Inspections

Measurement Criteria: *Use an appropriate forum and format to report area inspection documentation.*

Measurement Criteria: *Verify that inspections are thorough, timely and cover all relevant aspects of health safety, and/or environmental concerns.*

Measurement Criteria: *Verify that inspection includes visual inspections as well as information gathered directly from workers.*

Measurement Criteria: *Arrange for relevant experts in situations needing additional credibility on an as needed basis.*

Performance Element: **Submit inspection and audit findings to correct parties.**

Measurement Criteria: *Verify that record of transmittal of inspection and audit findings is complete, accurate, and includes all necessary signatures.*

Measurement Criteria: *Verify that inspection and audit findings are on file.*

Measurement Criteria: *Post inspection and audit findings appropriately to ensure their accessibility to all relevant parties.*

Performance Element: **Regularly check job safety analysis against actual experience.**

Measurement Criteria: *Conduct verification according to approved schedule.*

Measurement Criteria: *Do the verification on the basis of the existing data.*

Measurement Criteria: *Verify that compliance rate reports are on file.*

Pathway Topic: Compliance

Pathway KS Statement: **Implement health, safety, and/or environmental programs, projects, policies, or procedures.**

Performance Element: **Document regulatory compliance.**

Measurement Criteria: *Use approved schedules and specifications to complete regulatory compliance activities.*

Measurement Criteria: *Verify that compliance documentation meets all regulatory, legal, and company standards.*

Measurement Criteria: *Verify that the current list of applicable regulations is accessible to all parties as required.*

Measurement Criteria: *Verify that compliance documentation is on file and accessible to all relevant parties.*

Measurement Criteria: *Maintain a system for filing the sign-off sheets for compliance.*

Performance Element: **Communicate company health, safety, and environmental policies and procedures.**

Measurement Criteria: *Make health, safety, and environmental policies appropriately visible in the workplace.*

Measurement Criteria: *Use multiple methods to communicate policies and procedures.*

Measurement Criteria: *Maintain records of worker notification of policies and procedures on file.*

Measurement Criteria: *Deliver communication to correct parties in a timely manner.*

Measurement Criteria: *Obtain feedback from workers to determine effectiveness of communications.*

Measurement Criteria: *Use worker feedback to modify communication methods.*

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Pathway Topic: Compliance

Performance Element: Stop unsafe work practices.

- Measurement Criteria:** *Modify manufacturing process to attain adequate levels of safety.*
- Measurement Criteria:** *Correct unsafe behavior immediately and communicate to correct parties.*
- Measurement Criteria:** *Use appropriate forum and format to document notice of unsafe practices.*
- Measurement Criteria:** *Use preventive maintenance or departmental safety audits to record corrective action for unsafe work practices.*
- Measurement Criteria:** *Update safety policies on a regular basis.*
- Measurement Criteria:** *Determine if observations and review of safety records show reduction in targeted injuries or unsafe behaviors.*
- Measurement Criteria:** *Give priority to avoiding unsafe practices when planning new manufacturing processes.*

Performance Element: Suggest solutions that will eliminate unsafe practices.

- Measurement Criteria:** *Make sure all relevant parties are included in the development of safety solutions.*
- Measurement Criteria:** *Schedule follow-up meetings that include all appropriate parties to discuss solutions.*
- Measurement Criteria:** *Test and revise proposed solution(s) as necessary.*
- Measurement Criteria:** *Document suggestions and forward to correct parties.*

Performance Element: Report violations to appropriate authorities.

- Measurement Criteria:** *Keep violation reports, including disciplinary action where appropriate, on file.*
- Measurement Criteria:** *Distribute violation reports to the responsible party.*
- Measurement Criteria:** *Follow the legal, regulatory and company policy to communicate violations to the proper authorities.*
- Measurement Criteria:** *Use the chain of command to ensure that corrective action is taken.*
- Measurement Criteria:** *Use the appropriate channels to report health, safety, and environmental concerns.*

Performance Element: Prepare for health, safety, and environmental emergencies.

- Measurement Criteria:** *Develop employee and fire emergency plans before emergencies occur.*
- Measurement Criteria:** *Implement employee and fire emergency plans during an emergency.*
- Measurement Criteria:** *Verify that emergency equipment is available and in working order.*
- Measurement Criteria:** *Take necessary action to ensure that employees are properly trained in emergency procedures.*
- Measurement Criteria:** *Use company policies and procedures to complete emergency drills.*

Pathway Topic: Continuous Improvement

Pathway KS Statement: *Implement continuous improvement in health, safety,*

Pathway Topic: Continuous Improvement and/or environmental practices.

Performance Element: Analyze root causes or problems and prioritize problems that need to be addressed first.

Measurement Criteria: Identify, document, and communicate priorities clearly.

Measurement Criteria: Use appropriate data to prioritize goals and problems.

Measurement Criteria: Use specific situations to base selection of appropriate data analysis methods.

Measurement Criteria: Complete data analysis documentation accurately.

Measurement Criteria: Use input from workers and management to determine priorities.

Performance Element: Analyze health, safety, and/or environmental data.

Measurement Criteria: Verify that analysis contains sufficient detail to meet applicable standards.

Measurement Criteria: Complete documentation of analysis accurately.

Measurement Criteria: Make raw data available for inspection.

Measurement Criteria: Compare company's health, safety, and/or environmental assurance trends against industry health, safety, and/or environmental trends.

Measurement Criteria: Forward analysis to correct parties.

Measurement Criteria: Select appropriate analysis methods and use them properly.

Measurement Criteria: Use appropriate and accurate metrics and/or develop them for use in the analysis.

Measurement Criteria: Use charts, graphs, or tables to communicate data in written conclusions and plans.

Performance Element: Determine projects to address priorities.

Measurement Criteria: Design projects to support and reinforce established company goals.

Measurement Criteria: Take necessary action to involve all relevant parties in the development of the project.

Measurement Criteria: Use scheduling methods to ensure timely development.

Measurement Criteria: Verify that project plans are complete, detailed and include the resource requirements.

Performance Element: Benchmark health, safety, and/or environmental practices.

Measurement Criteria: Gather appropriate information from recognized industry leaders.

Measurement Criteria: Arrange for independent evaluations of worksite health, safety, and/or environmental assurance practices.

Measurement Criteria: Use benchmarking information as a basis for making recommendations.

Measurement Criteria: Conduct and document analysis comparing current practice against benchmark data.

Measurement Criteria: Use a variety of means to gather information regarding excellent health, safety, and/or environmental assurance practices.

Pathway Topic: Continuous Improvement

Performance Element: Maintain knowledge of policies and procedures for health, safety, and/or environmental issues.

Measurement Criteria: *Attend workshops, conferences, and other career development sessions.*

Measurement Criteria: *Take action to ensure that involvement in a professional society relevant to job activities is ongoing.*

Measurement Criteria: *Take action to ensure that up-to-date resources on health, safety, and/or environmental assurance are accessible to all relevant parties.*

Pathway Topic: Promotion

Pathway KS Statement: **Promote health, safety, and/or environmental assurance programs.**

Performance Element: Be an advocate for workplace safety.

Measurement Criteria: *1. □ Make workplace safety posters and other relevant information visible.*

Measurement Criteria: *2. □ Identify, model, recognize, and publicize manufacturing practices for health, safety, and/or environmental assurance.*

Measurement Criteria: *3. □ Make sure that workers responsible for health, safety, and/or environmental assurance are regularly present in manufacturing workplace to encourage good health, safety, and/or environmental assurance practices.*

Measurement Criteria:

Performance Element: Suggest health, safety, and/or environmental assurance programs to management and other workers.

Measurement Criteria: *Keep materials supporting health, safety, and/or environmental assurance programs on file.*

Measurement Criteria: *Document suggestions supporting health, safety, and/or environmental assurance.*

Measurement Criteria: *Forward suggestions supporting health, safety, and/or environmental assurance to all relevant parties.*

Measurement Criteria: *Make suggestions based on an accurate assessment of employee needs and interests, requirements in the workplace, and business objectives.*

Measurement Criteria: *Discuss data and statistical analysis with decision-makers.*

Measurement Criteria: *Hold meetings to advocate for health, safety, and/or environmental assurance programs with all relevant parties.*

Measurement Criteria: *Use various methods to market benefits of high quality suggestions supporting health, safety, and/or environmental assurance programs.*

Performance Element: Evaluate health, safety, and/or environmental assurance programs.

Measurement Criteria: *Continuously maintain, evaluate, and report recordable incidents of injury and other incidences of health, safety, and/or environmental assurance.*

Measurement Criteria: *Maintain a log of health, safety, and/or environmental*

Pathway Topic: Promotion

assurance information.

Measurement Criteria: *Communicate evaluations to correct parties in a timely manner.*

Measurement Criteria: *Use evaluations to improve the outcomes of health, safety, and/or environmental assurance programs.*

Measurement Criteria: *Keep self-assessment studies on health, safety, and/or environmental assurance programs on file.*

Measurement Criteria: *Compare health, safety, and/or environmental assurance statistics with industry benchmarks or standards.*

Performance Element: **Educate others about the benefits of health, safety, and/or environmental assurance programs.**

Measurement Criteria: *Design or purchase materials supporting health, safety, and/or environmental assurance programs that are clear and appropriate for the intended audience.*

Measurement Criteria: *Keep health, safety, and/or environmental assurance materials on file and accessible.*

Measurement Criteria: *Hold meetings to educate individuals about health, safety, and/or environmental assurance programs with all relevant groups.*

Measurement Criteria: *Use various methods to advertise benefits for and elements of high quality health, safety, and/or environmental assurance programs.*

Measurement Criteria: *Use various methods to educate new hires about the company's commitment to safety.*

Measurement Criteria: *Provide continuing education to employees.*

Measurement Criteria: *Make sure that education activities include cost-benefit analysis of workers' compensation programs.*

Performance Element: **Conduct activities that educate others about the benefits of workplace health, safety, and/or environmental assurance programs.**

Measurement Criteria: *Design or purchase materials supporting health, safety, and/or environmental assurance programs that are clear and appropriate for the intended audience.*

Measurement Criteria: *Verify that health, safety, and/or environmental assurance materials are on file and accessible.*

Measurement Criteria: *Hold meetings with all relevant groups to educate individuals about health, safety, and/or environmental assurance programs.*

Measurement Criteria: *Use various methods to advertise benefits for and elements of high quality suggestions supporting health, safety, and/or environmental assurance programs.*

Measurement Criteria: *Use appropriate methods to educate new hires about the company's commitment to safety.*

Measurement Criteria: *Provide continuing education to employees.*

Measurement Criteria: *Include cost-benefit analysis of workers' compensation programs in education activities.*

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Pathway Topic: Analysis

Pathway KS Statement: Conduct job safety and health analysis for jobs, equipment, and processes.

Performance Element: Consult with outside sources about health, safety, and/or environmental assurance aspects of jobs.

Measurement Criteria: *Maintain an accurate list of relevant outside sources.*

Measurement Criteria: *Make postings of current emergency contact information accessible to all relevant parties.*

Measurement Criteria: *Maintain a contact log.*

Performance Element: Participate in the development of job safety analysis.

Measurement Criteria: *Hold meetings to conduct job safety analysis with all relevant parties.*

Measurement Criteria: *Generate suggestions for job safety improvements.*

Measurement Criteria: *Document and analyze relevant data.*

Measurement Criteria: *Hold one-on-one and small group meetings with workers to identify job safety issues.*

Measurement Criteria: *Make observations at worksites on a regular basis to gather information for job safety analysis.*

Performance Element: Gather information from employees about occupational hazards.

Measurement Criteria: *Observe employees on a regular basis for safe work behaviors and practices.*

Measurement Criteria: *Maintain records of employee interviews regarding occupational hazards.*

Measurement Criteria: *Publish and distribute safety reports and statistics to relevant parties.*

Measurement Criteria: *Provide a method for employees to report safety concerns to relevant parties.*

Performance Element: Suggest ways to eliminate hazards.

Measurement Criteria: *Keep suggestions for eliminating the hazard on file.*

Measurement Criteria: *Complete safety-related work orders in a timely manner.*

Measurement Criteria: *Communicate suggestions to correct parties.*

Measurement Criteria: *Make suggestions that are relevant and appropriate.*

Performance Element: Regularly verify job safety analysis against experience.

Measurement Criteria: *Evaluate job safety analysis with relevant injury and worksite data.*

Measurement Criteria: *Interview employees to gain their input.*

Performance Element: Conduct activities that educate others about the benefits of workplace health, safety, and/or environmental assurance programs.

Measurement Criteria: *Design or purchase materials supporting health, safety, and/or environmental assurance programs that are clear and appropriate for the intended audience.*

Measurement Criteria: *Verify that health, safety, and/or environmental assurance materials are on file and accessible.*

Measurement Criteria: *Hold meetings with all relevant groups to educate individuals*

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Pathway Topic: Analysis

about health, safety, and/or environmental assurance programs.

Measurement Criteria: *Use various methods to advertise benefits for and elements of high quality suggestions supporting health, safety, and/or environmental assurance programs.*

Measurement Criteria: *Use appropriate methods to educate new hires about the company's commitment to safety.*

Measurement Criteria: *Provide continuing education to employees.*

Measurement Criteria: *Include cost-benefit analysis of workers' compensation programs in education activities.*

Pathway Topic: Safety

Pathway KS Statement: Maintain a safe and productive workplace.

Performance Element: Follow local, federal and company regulations to perform environmental and safety inspections.

Measurement Criteria: *Identify, report and monitor potential hazards in the workplace.*

Measurement Criteria: *Take corrective action to correct potential hazards.*

Measurement Criteria: *Review health, safety, and environmental documentation and policies thoroughly and regularly.*

Measurement Criteria: *Ensure that inspections meet all relevant, health, safety, and environmental laws and regulations.*

Measurement Criteria: *Completed inspections according to company schedule and procedures.*

Measurement Criteria: *Document inspection records and store them correctly.*

Performance Element: Participate in emergency response teams to perform emergency drills.

Measurement Criteria: *Confirm that first aid training and certification on emergency and first aid procedures are complete and up-to-date.*

Measurement Criteria: *Comply with company and regulatory policies and procedures to respond to emergencies.*

Measurement Criteria: *Document emergency drills and incidents according to company and regulatory procedures promptly.*

Performance Element: Identify unsafe conditions and take corrective action.

Measurement Criteria: *Identify, report, and document conditions presenting a threat to health, safety, and the environment.*

Measurement Criteria: *Identify corrective actions.*

Measurement Criteria: *Consult appropriate parties about corrective actions and take corrective actions following company procedures promptly.*

Measurement Criteria: *Track and report ongoing safety concerns until corrective action is taken.*

Performance Element: Provide safety orientation to train other employees in safe practices and emergency procedures.

Measurement Criteria: *Verify that all topics and procedures are covered in orientation to facilitate employee safety.*

Measurement Criteria: *Observe orientation to ensure that it makes clear the need and*

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Pathway Topic: Safety

processes for employees to raise safety concerns, ask questions, and receive additional training.

Measurement Criteria: *Use company requirements to document orientation.*

Measurement Criteria: *Verify that orientation meets all relevant laws, policies, and regulations.*

Measurement Criteria: *Deliver safety instruction and updates on a regular schedule.*

Pathway Topic: Training

Pathway KS Statement: ***Train workers in health, safety, and/or environmental issues.***

Performance Element: **Determine priorities for health, safety, and/or environmental training needs.**

Measurement Criteria: *Conduct analysis of health, safety, and/or environmental tasks at the job level.*

Measurement Criteria: *Analyze health, safety, and/or environmental records to identify training needs.*

Measurement Criteria: *Document results of training assessments.*

Measurement Criteria: *Use the analysis to develop training plans with clear objectives.*

Measurement Criteria: *Solicit worker input regarding training needs.*

Performance Element: **Prepare health, safety, and/or environmental training materials .**

Measurement Criteria: *Use appropriate resources to ensure that content included in training materials meets industry, government, and company standards.*

Measurement Criteria: *Work with appropriate personnel to ensure that the training materials includes the correct content to meet the training needs.*

Measurement Criteria: *Develop and implement a system to ensure that training materials are updated continuously.*

Measurement Criteria: *Work with appropriate personnel and outside sources as needed to make sure that training materials are clear, worker-friendly, and appropriate for the audience.*

Measurement Criteria: *Develop and implement a system to ensure that training materials are available and accessible to all relevant parties.*

Performance Element: **Conduct health, safety, and/or environmental training for employees.**

Measurement Criteria: *Document employee records to show that training has been delivered.*

Measurement Criteria: *Develop a training schedule that facilitates participation of employees.*

Measurement Criteria: *Develop evaluations that indicate workers' understanding of the training materials.*

Measurement Criteria: *Develop a system for verifying that appropriate workers receive training.*

Measurement Criteria: *Show how test results and certifications achieved indicate effective training.*

Pathway Topic: Training

Performance Element: Document required health, safety, and/or environmental training.

Measurement Criteria: *Maintain training attendance records on file.*

Measurement Criteria: *Develop and maintain a training profile for each job.*

Measurement Criteria: *Maintain accurate records of test results and certifications achieved.*

Measurement Criteria: *Make documentation available on an as needed basis to appropriate parties.*

Measurement Criteria: *Request feedback from trainees and document feedback that is received.*

Measurement Criteria: *Maintain confidentiality of the outcomes of the health, safety, and/or environmental assurance training.*

Performance Element: Plan future health, safety, and/or environmental training.

Measurement Criteria: *Make sure that appropriate content is included in training plans.*

Measurement Criteria: *Design training for the specific needs of individuals.*

Measurement Criteria: *Ask appropriate workers for input related to the content of the training.*

Measurement Criteria: *Design training plan to include effective evaluation and follow-up process.*

Measurement Criteria: *Include worker feedback when developing future training.*

Section IV – O*NET Crosswalk Report

Career Specialty/ Occupational Coding and Crosswalk

Summary

The objective of the Career Specialty/ Occupational Coding and Crosswalk project is to accomplish two basic tasks. The first is to design and establish a classification and coding structure for the States' Career Clusters Initiative. When completed, the classification and coding structure will be compatible with existing occupational classification systems and designed in a manner that allows for easy updating and the flexibility to add additional career pathways and occupational specialties.

Once the first step is completed for each cluster, the second step is to build a linkage system or crosswalk between the new career cluster classification system and the O*NET occupational classification system developed and operated by the U S Department of Labor. O*NET is a nationally recognized taxonomy with detailed descriptions and a rich database of information for each occupation.

Explanation of Crosswalk Table

The attached table lists each occupational specialty and its related O*NET occupation. It is sequenced by career pathway and occupational specialty code. It should be noted that the relationship between an occupational specialty and its related O*NET occupation is often not one-to-one. The O*NET occupation is often much broader covering two or more occupational specialties. In fact, even when multiple occupational specialties are assigned, they may only represent a part of a broader O*NET occupation.

Column 1: Lists occupational specialties that were identified by the Career Clusters Initiative. The occupational specialties are organized by cluster pathways and represent occupational titles with no definitions. They are intended to be a sample of occupations that help define the cluster and pathway.

Column 2: Represents related occupations from the O*NET occupational coding system.

Note: A crosswalk from the occupational specialties to the Classification of Instructional Programs (CIP) codes is forthcoming. The National Crosswalk Service Center is currently developing the CIP to O*NET crosswalk which will be the bridge to the career cluster occupational specialties. You may access this crosswalk in the near future at: <http://www.xwalkcenter.org/>

**Manufacturing Career Cluster: Occupational Specialties and Related SOC/O*NET Occupations
Sequenced by Career Pathway and Occupational Specialty Code**

Occupational Specialty		Related SOC/O*NET Occupation	
Code	Title	Code	Title
13.10000	Precision Metal Production Pathway		
13.10010	Welders	51-4121.01	Welders, Production
13.10010	Welders	51-4121.02	Welders and Cutters
13.10010	Welders	51-4121.03	Welder-Fitters
13.10010	Welders	51-4122.01	Welding Machine Setters and Set-Up Operators
13.10010	Welders	51-4122.02	Welding Machine Operators and Tenders
13.10020	Managers, Supervisors	11-3051.00	Industrial Production Managers
13.10020	Managers, Supervisors	51-1011.00	First-Line Supervisors/Managers of Production and Operating Workers
	Operators, Tenders, Cutters/Brazers, Soldering, Machine Operations		
13.10030		99-9999.00	To broad to classify to a specific O*NET occupation
13.10040	Foundry Workers	99-9999.00	To broad to classify to a specific O*NET occupation
13.10050	Sheet Metal Workers	47-2211.00	Sheet Metal Workers
13.10060	Inspectors	51-9061.00	Inspectors, Testers, Sorters, Samplers, and Weighers
13.10070	Tool and Die Makers	51-4111.00	Tool and Die Makers
13.10080	Machine tool Operators, Computer Aides, Machine Operators	99-9999.00	To broad to classify to a specific O*NET occupation
13.20000	Production Design, Operations, and Maintenance Pathway		
13.20010	Production Managers	11-3051.00	Industrial Production Managers
13.20020	Purchasing Agents	13-1023.00	Purchasing Agents, Except Wholesale, Retail, and Farm Products
13.20030	Engineers	17-2000.00	Engineers
13.20040	Automated Manufacturing Technicians	99-9999.00	No comparable O*NET Occupation
13.20050	Process Control Technicians	99-9999.00	No comparable O*NET Occupation
13.20060	Labor Relations Managers	11-3040.00	Human Resources Managers
13.20060	Labor Relations Managers	11-3041.00	Compensation and Benefits Managers
13.20060	Labor Relations Managers	11-3042.00	Training and Development Managers

**Manufacturing Career Cluster: Occupational Specialties and Related SOC/O*NET Occupations
Sequenced by Career Pathway and Occupational Specialty Code**

Occupational Specialty		Related SOC/O*NET Occupation	
Code	Title	Code	Title
13.20070	Industrial and Manufacturing Engineers	17-2112.00	Industrial Engineers
13.20070	Industrial and Manufacturing Engineers	17-2131.00	Materials Engineers
13.20070	Industrial and Manufacturing Engineers	17-2141.00	Mechanical Engineers
13.20080	Plastics Production Workers, Extrusion Machine Operators	51-4021.00	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic
13.20080	Plastics Production Workers, Extrusion Machine Operators	51-4072.01	Plastic Molding and Casting Machine Setters and Set-Up Operators
13.20080	Plastics Production Workers, Extrusion Machine Operators	51-4072.02	Plastic Molding and Casting Machine Operators and Tenders
13.20090	Home Furnishings Production Workers	99-9999.00	To broad to classify to a specific O*NET occupation
13.20100	Clothing Production Workers, Supervisors, Inspectors	99-9999.00	To broad to classify to a specific O*NET occupation
13.20110	Boilermakers	47-2011.00	Boilermakers
13.20120	Millwrights	49-9044.00	Millwrights
13.20130	Industrial Maintenance Technicians	49-9041.00	Industrial Machinery Mechanics
13.20130	Industrial Maintenance Technicians	49-9042.00	Maintenance and Repair Workers, General
13.20130	Industrial Maintenance Technicians	49-9043.00	Maintenance Workers, Machinery
13.20140	Industrial Facilities	49-9042.00	Maintenance and Repair Workers, General
13.30000	Electromechanical Installation and Maintenance Pathway		
13.30010	Biomedical Equipment Technicians	49-9062.00	Medical Equipment Repairers
13.30020	Laser Systems Technicians	17-3029.00	Engineering Technicians, Except Drafters, All Other
13.30030	Computer Maintenance Technicians	49-2011.02	Data Processing Equipment Repairers
13.30040	Computer Installers/Repairers	49-2011.02	Data Processing Equipment Repairers
13.30050	Communication System Installers/Repairers	99-9999.00	To broad to classify to a specific O*NET occupation
13.30050	Communication System Installers/Repairers	49-2022.01	Central Office and PBX Installers and Repairers
13.30050	Communication System Installers/Repairers	49-2022.02	Frame Wires, Central Office
13.30050	Communication System Installers/Repairers	49-2022.03	Communication Equipment Mechanics, Installers, and Repairers
13.30050	Communication System Installers/Repairers	49-2022.04	Telecommunications Facility Examiners
13.30050	Communication System Installers/Repairers	49-2022.05	Station Installers and Repairers, Telephone

**Manufacturing Career Cluster: Occupational Specialties and Related SOC/O*NET Occupations
Sequenced by Career Pathway and Occupational Specialty Code**

Occupational Specialty		Related SOC/O*NET Occupation	
Code	Title	Code	Title
13.30060	Industrial Electronic Installers/Repairers	49-2094.00	Electrical and Electronics Repairers, Commercial and Industrial Equipment
13.30070	Residential Electronics Installers/Repairers	49-2097.00	Electronic Home Entertainment Equipment Installers and Repairers
13.30080	Meter Installers/Repairers	49-9012.01	Electric Meter Installers and Repairers
13.30080	Meter Installers/Repairers	49-9012.03	Meter Mechanics
13.30090	Security System Installers/Repairers	49-2098.00	Security and Fire Alarm Systems Installers
13.30100	Electrical Equipment Installers/Repairers	49-2094.00	Electrical and Electronics Repairers, Commercial and Industrial Equipment
13.30110	Utility Managers, Dispatchers	11-9199.00	Manager, All Other
13.30110	Utility Managers, Dispatchers	51-8012.00	Power Distributors and Dispatchers
13.30120	Power Generating and Reactor Plant Operators	51-8011.00	Nuclear Power Reactor Operators
13.30120	Power Generating and Reactor Plant Operators	51-8013.01	Power Generating Plant Operators, Except Auxiliary Equipment Operators
13.30130	Instrument Calibration and Repairers	49-9060.00	Precision Instrument and Equipment Repairers
13.30140	Instrument Control Technicians	17-3023.02	Calibration and Instrumentation Technicians
13.30150	Major Appliance Repairers	49-9031.00	Home Appliance Repairers
13.40000	Precision Technology Processes Pathway		
13.40010	Calibration Technicians	17-3023.02	Calibration and Instrumentation Technicians
13.40020	Instrument Makers	99-9999.00	To broad to classify to a specific O*NET occupation
13.40030	Pattern & Model Makers	51-4062.00	Patternmakers, Metal and Plastic
13.40030	Pattern & Model Makers	51-7032.00	Patternmakers, Wood
13.40030	Pattern & Model Makers	51-4061.00	Model Makers, Metal and Plastic
13.40040	Supervisors		
13.40050	Quality Control Technicians	51-1011.00	First-Line Supervisors/Managers of Production and Operating Workers
13.40060	Medical Appliance Makers	17-3026.00	Industrial Engineering Technicians
13.40070	Precision Optical Goods Workers	51-9082.00	Medical Appliance Technicians
13.40070	Precision Optical Goods Workers	51-9083.01	Precision Lens Grinders and Polishers
13.40070	Precision Optical Goods Workers	51-9083.02	Optical Instrument Assemblers

Section V – Cluster Profile Advisory Committee List

Career Cluster Profile

Cluster Name: Manufacturing

Project Lead State: Indiana

Project Lead State Contact Information:

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State Director, Vocational Technical Education
Department of Workforce Development
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Cluster Coordinators: Ron McCage, Chris Olson, and Scott Hess

Cluster Definition: (DRAFT) Planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Cluster Pathways: (DRAFT) Precision Metal Production; Production Design, Operations, and Maintenance; Electromechanical Installation and Maintenance; Precision Technology Process (To be revised)

Cluster Partners: (DRAFT) List attached. (A number of associations and government agencies represent business, industry, labor, and education. Some government agencies and associations represent both secondary and postsecondary education.)

Number of cluster partners in each of the following categories:

Postsecondary Education:	<u>2</u>
Secondary Education:	<u>11 pilot sites</u>
Business & Industry:	<u>5</u>
Labor:	<u>2</u>
Associations:	<u>5</u>
Government Agencies:	<u>16</u> (27 states participated during project)

Deliverable # 1: Manufacturing

Updated March 7, 2002

Name	Job Title	Organization/ Company/School	Address	City	State, ZIP	Phone	E-mail	Pathway
Bauer, Tom	Consultant	Adult Education Policy and Planning Unit California Dept. of Education	560 J Street, Suite 290 P. O. Box 944272	Sacramento	CA 95814	916 323 2570		
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Lundy, Vic	State Supervisor T & I	Iowa Department of Education Community college Division	Grimes State Office Bldg.	Des Moines	IA 50319	515 281 4722	vic.lundy@ed.state.ia.us	

Name	Job Title	Organization/ Company/School	Address	City	State, ZIP	Phone	E-mail	Pathway
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Name	Job Title	Organization/ Company/School	Address	City	State, ZIP	Phone	E-mail	Pathway
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White, Barbara	Coordinator of Research and Development	Office of State Director for Vocational Education University of Hawaii	Sinclair Library, Mezzanine 2 2425 Campus Road	Honolulu	HI 96822	808 956 6089	whiteb@hawaii.edu	
Sherman, Bob		National Institute for Metalworking Skills					RWS100@aol.com	

**Manufacturing
Linkages/Cluster
Project**

**PILOT SITE
LOCATIONS
(Inactive at this
time)**

Arizona

East Valley Institute of Technology

Susan Simeone
Lee Townsend
Christine Post

Georgia

Lee County Schools

Sandra Parker
Stan Westbrook

Hawaii

Leilehua High School

Cynthia Elia
Margaret Ohara

Illinois

United Township Area Career Center

Dale Adamson
Roger Sturm

Indiana

Blue River Career Programs

Robert Hobbs

Kentucky

Allen County Schools

Jim Young

Michigan

Breithaupt Career Technical Center

GASC Technology Center

Sharion Brown
Sylvester Lane
Pat Leaveck

Nebraska

Columbus High School, Columbus

Steven Woodside
Ronald Haefner
Robert Dierman

North Carolina

Byrd High School

John Bolen

Ohio

South-Western City Schools

Steward Gibboney
Sherry Minton

Oregon

Portland Public Schoools

Portland Community Schools

Jan Wierima
Connie christopher

Pennsylvania

Lancaster Cty Career & Technology Cen

Janet Duck
Tony Gillespie
Mike Curley

Virginia

Russell Co. Career & Technology Center

New Horizons Regional Ed. Center
Chesterfield County Public Schools

Harry Sydow
Harry Whitehead
Kurt Strovinnk
David Dobbs

Wisconsin

Racine Unified Schools

Dave Smerchek

West Virginia

Mercer Co. Technical Ed. Center

W. Joe Fuda
William Sherwood
William Clark

Section VI – Assessment Protocol Certification Protocol

Deliverable #7

Title: Protocol for Career Clusters Assessment

8/5/2002 4:00 PM

Definition of Career Clusters Assessment

Assessment, within the context of the Career Clusters Initiative, is defined as *a **measurement** of what a learner should know and be able to do*. The academic and technical knowledge and skills common to all occupations and pathways within a single cluster are initially addressed in the Career Clusters Initiative. Each cluster measures or assesses a learner's knowledge and skills related to the cluster.

Purpose of the Protocol for Career Clusters Assessments

The purpose of this document is to provide:

- Minimum criteria for selecting existing assessment instruments that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for developing new assessment instruments that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for validating and determining reliability of assessment instruments.

Functions of Career Clusters Assessment

Career Cluster Assessment serves to

- *measure* (assess) *student achievement*, both cognitive and performance, in areas of academic and technical knowledge and skills for each cluster
- *provide the basis* for a transportable, industry-endorsed certification.

Operational Guidelines for Career Clusters Assessment

This protocol includes minimum criteria/expectations career cluster designers need to apply in the selection/development of assessment modalities. Career clusters assessment:

CONTENT

- measures all 10 Foundation knowledge and skills.
- customizes context of questions and applications to individual clusters.
- reflects a high degree of specificity of measurable knowledge and skills.
- aligns to academic standards.
- connects to post high school standards and competencies.
- is consistent with Perkins data-quality criteria.

FORM

- combines a minimum of two modalities: cognitive and performance.
- includes an item bank that can accommodate multiple applications.
- reflects quality design and clear formats.

APPLICATIONS AND USES

- offers diagnostic feedback to the learner.
- provides added value to the user (employer, post high school); not required for employment.
- affords portability of results.
- provides cues for instruction.

ADMINISTRATION

- validates identity of test takers through a secure system.
- affords flexible administration, e.g. single assessment per foundation cluster topic or combination of topics.
- provides flexible timing for administration.
- affords no cost or low cost to students.
- includes an affordable, user-friendly process to cover administrative costs.
- reflects an administration process that is as consistent as possible with other career cluster assessments.
- includes an affordable, user-friendly maintenance process.

VALIDITY AND RELIABILITY

- uses consistent, reliable, and technically strong elements.
- is recognized by business and industry.
- is recognized by post high school education and training.

Deliverable #8

Title: Protocol for Career Clusters Certification

8/23/2002 2:28 PM

Definition of Career Clusters Certification

Certification, within the context of the States' Career Clusters Initiative, *documents* learner achievement of the academic and technical knowledge and skills common to all pathways and occupations within a cluster. It is based on valid and reliable assessments. A certificate is recognized by employers, secondary education, and post high school education as "value added to the admissions process to further education, immediate employment process, and/or to employment advancement".

Purposes of the Protocol for Careers Cluster Certification

The purposes of this document are to provide:

- Minimum criteria for selecting existing certification programs that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for developing new certification programs that align to the academic and technical knowledge and skills identified for each cluster.
- Minimum criteria for determining the value of a certification program.

Functions of Career Clusters Certification

Career Cluster Certification serves to provide a consistent, transportable method of documenting learner achievement of a Career Cluster's validated academic and technical knowledge and skills. The system is based on valid and reliable assessments.

Operational Guidelines for Career Clusters Certification

This protocol includes minimum criteria/expectations career cluster designers need to apply in the selection/development of certification processes. Career clusters certification:

- Defines the purpose and scope of the certificate.
- Bases issue of the certificate on assessed learner proficiencies and competencies related to a Career Cluster's validated academic and technical knowledge and skills.
- Requires learner to meet the assessment benchmark identified.
- Informs the public concerning the knowledge and skills of the certificate holder.
- Indicates date of issue on the certificate.
- Issues certificate from the State (State Director of Career-Technical Education or appropriate designee) if the issuing organization is a secondary or post secondary education institution.
- Issues certificate from the CEO (or an appropriate designee) of an issuing professional organization/agency/institution/company.
- Requires issuing organization to maintain a database (state and/or national) of certificate holders based on the respective term of renewal.



National Association of State Directors
of Career Technical Education Consortium

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